MICROCOMPUTER SOFTWARE PACKAGES

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Tables & Figures

SECTION 1   EXECUTIVE SUMMARY

Since the introduction of the Altair 880 in 1975, the micro market
has repeatedly confounded attempts to predict the speed and shape of
its growth, and errors have usually involved under rather than over-
estimations of how fast it will grow. The largest problem is that
the micro market is changing as it grows, and that the pace of this
change far exceeds that in any other sector of the computer industry.
Consequently, there is no more dangerous approach to this market
than to assume that present structures, types of product and patterns
of usage and distribution are immutable, as the last eight years of
the micro market have demonstrated.

For this reason, this study is based on the identification of key
trends in each sector which are likely to impact the micro hardware
and software market over the 1983-93 forecast period, with projections
based on the anticipated changes in the size and shape of micro hard-
ware shipments and the installed base, in demand and procurement
patterns, in software technology and in pricing and distribution.
The resulting picture shows a growth pattern over the forecast period
which involves major shifts in the structure of the market itself,
in the supplier and distribution structures and in the type of pro-
ducts shipped.

Over the 1983-93 period, we anticipate that the following trends
and events will occur:

Differentiation of Markets:

For much of its history, the micro software market,
reflecting micro hardware, has shown a certain homogeneity:

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the paradigm is an Apple II package purchased from ComputerLand. The classical micro market is that for "personal computers" which can be defined according to choice but involve systems comparable to the Apple II, TRS-80, CP/M systems and more recently the IBM PC. These are usually purchased from a computer store specializing in personal computers with VisiCalc, a word processing or (slightly less common) a DBMS package and/or accounting software.

Over the forecast period, however, we will see a breakdown in this homogeneity, with distinctive types of hardware and software, usage patterns and distribution structures emerging.

Large Organizations: Over the next few years the large organization market will experience a transition away from a pattern of decentralized purchasing and usage towards centrally coordinated programs. Purchasing of hardware and software will increasingly involve bulk lots from single or a few sources. The larger systems vendors such as IBM, DEC and other mainframe, mini and office automation vendors will attempt to reassert control over movement of micros into their large accounts, while software will increasingly be supplied in bulk lots by the systems vendors and by distribution organizations or individual package vendors dealing directly with central functions in large organ-izations.

In the longer term, probably beginning in the 1985-86 timeframe, systems vendors will differentiate micro lines offered to large accounts from broader micro lines by integrating functions into them which tie them into communications systems involving higher-level protocols -- the result will be the mutation of micros in large organizations into

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"intelligent communicating workstations". The beginnings of this trend can be observed with products such as DEC's VT 160 and IBM's PC/3278, but the trend can be expected to gather momentum with widespread use of Local Area Networks (LANs) and high-level PBX-based systems from 1985-86 onwards. The result will be a major increase in the degree of control exerted by systems vendors over large organization micro hardware and software markets.

This sector will also see large-scale use of integrated management packages combining hitherto discrete program functions into a single software product, with advantages in manager training, cost and single-source procurement increasingly outweighing the advantages of discrete single-function products. Products such as the Lotus 1-2-3 and the Context MBA are the "tip of the iceberg" and will account for the majority of the large organization package market in dollar volume as early as 1985-86.

Small Businesses: The small business market has traditionally accounted for three main types of packages -- general business packages such as spreadsheets, word processing and database management systems (DBMS) which also move into large organizations; packages for accounting, mailing list management and assorted functions such as order processing, sales analysis and inventory control; and vertical market packages, which are usually versions of the latter type customized for the particular formats and requirements of a specific type of business. Over the forecast period, the following can be expected to occur:

• Integrated management packages will also penetrate this market, although to a lesser degree than for large organizations, reducing sales of discrete packages such as spreadsheets, word processing and DBMS.

• Accounting and other small business-specific applications packages will increasingly develop into integrated sets of modules, capable of operating in stand-alone mode or as part of a larger system from the same vendor. This trend is already well-advanced, and by 1985-86 will account for most of this market. Mailing list packages will increasingly merge with word-processing packages, either as a single software product or via "fold-in" compatibility.

• This sector is likely to see major changes as a result of the extension of micro lines upwards into the market bracket hitherto occupied by conventional small business systems, a development that is again likely to gather momentum over the 1985-86 period. The result of this will be to bring into the micro market systems houses which have previously been handling larger systems, with a major expansion of the micro software market (particularly in vertical packages) as average software installation value rises. The actions of major systems vendors in introducing their micro lines into OEM distribution channels in 1983-84 can be considered a "curtain raiser" to this development. In the longer term, gathering momentum in the 1987-88 timeframe, the distribution picture in this sector will undergo further changes as the direct marketing forces of systems vendors become active in handling higher-priced micro lines destined for the small business market.

<u>The Home Market:</u> The widespread penetration of micros into the home
over the past few years, which began with the more expensive desktop
models, (many of them used for business-related applications in the
home by small business principals, professionals and the self-employed),
has now come to include "home" or low-end (under $1,000) and portable
micros.   The majority of micro use in homes revolves around the play-
ing of games, and this seems likely to continue throughout the forecast
period.   Educational packages and other types of "personal" software
(e.g. home and personal finance/management) will also be contributing,
and business-related processing will be increasing as the use of por-
tables spreads and as an increasing number of managers, executives and
other types of large organization salaried employees take their work home
on their briefcase computer rather than in their briefcase. The "home"
market will see the following developments:

• The merger of the markets for low-end micros in the $25-$150 bracket
and for video game machines, with low-end micros phasing out the latter
over the 1983-86 period and becoming the dominant type of hardware used
for playing games by the 1987-88 period. This will be reflected in
substantial growth in the market for games packages, but existing
consumer games bases and a slow-down in the rate of penetration of
games-playing hardware into households will mean that market growth
will be slower overall than has been the case for video game machines
and ROM cartridges over the 1980-83 period.

• The emergence of a distinct category of low-end micros priced in
the $500-$600 range over 1983-84, with more sophisticated processing
capabilities and bundled communications capabilities.   This group of

products will tend to be used more for business-related, education, "personal" and communications functions, and this will be reflected in the software package market.

● The longer-term (1985-87) merger of the $500-$600 micro bracket with portables, resulting in similar product lines from most vendors in both hardware and software for these lines.

● A shift in software distribution to this market away from special- ized (i.e. computer and software) stores to more general types of re- tail outlets, with a corresponding shift in the intermediate distri- bution structure making distributors of consumer entertainment pro- ducts more important players in the market as they move from audio and video products to faster-growing software package lines.

● In the games market, the emergence of a market for micro software packages comparable in scale and behavior to that for video games products will lead to this sector becoming increasingly characterized by mass-marketing approaches by vendors, with heavy advertising, fre- quent price reductions and/or "specials", and greater attention to packaging, display techniques and competition for retail shelf space. This trend will inevitably favor larger companies with extensive resources and experience in this area -- the entertainment companies already dealing in audio and video products will also benefit from their ability to leverage themes which already enjoy widespread market recognition.

Educational Institutions: Although greatly overrated as a micro- computer software market, software demand by educational institutions of all types will develop as a major market during the forecast period,

although even at its peak it is unlikely to account for more than 6%
of the total market by dollar volume. It will, however, continue to
serve as a useful source of skills and a "test-bed" for educational
products that will later be sold into the consumer market. This
sector is in the process of evolving a distinctive marketing and
distribution structure, with the early pattern of combined mail order
and store sales giving way to a complex multi-tiered structure involving
educational publishers, audio-visual materials suppliers, micro
vendors, specialist distributors and distributors of audio-visual
materials and school supplies and equipment.

The net result of these developments is that the micro software
market is seeing differentiation by sector not merely in terms of pro-
duct but of the type of distribution channels and marketing approaches
most appropriate for reaching particular areas of the market.

Key Product Trends: Integration and User-Friendliness

In most of the market sectors for micro software packages, product
trends can be summarized by two terms: "integration" and "user-friendli-
ness". Examples are as follows:

● In general business packages (a category consisting largely of spread-
sheet, word-processing, DBMS and, to a lesser extent, business graphics
and assorted scheduling and planning systems), current trends are
towards integrated product families allowing data to be transferred
between sets of compatible single-function packages and towards multi-
function integrated management packages, described earlier. A further
step in this process will occur over the next few years as these types
of product are merged into extremely user-friendly operating systems

using multi-window and cursor formats.   The result will be that many
of the types of general business packages (principally spreadsheets
and business graphics packages) will become declining proportions
of the market and will have effectively disappeared by the end of the
forecast period as discrete products.

• In small business packages for standard applications, integrated
product families will become the dominant type of product over the
next 2-3 years.   User-friendly operating systems can be expected to
make some inroads into this market, but later in the decade and only
when satisfactory means have been found to allow conventional appli-
cations formats to be handled with this type of system.

• In vertical packages, the trend will be comparable to that in
standard small business applications packages, with a lag of probably
2-3 years.   There will also be a marked trend in software for larger
micro-based systems to be sold as part of turnkey or packaged hardware/
software configurations, as is currently common in the conventional
small business systems market.

• In consumer markets, the introduction of highly user-friendly
operating systems on low-end micros can be expected over the 1984-86
timeframe, allowing users considerably more potential to develop their
own games formats and to use micro color graphics capabilities for cre-
ative "painting" activities.   In addition, there is also a clear
trend towards sale of larger packages and/or product families which
contain a variety of games and/or more complex, longer-playing programs.

• In systems and programming packages, the trend is also towards
multi-function program development "kits" and towards products which

allow less technically competent users to engage in programming.
The spread of user-friendly operating systems will promote this trend,
with many of the techniques used being transferred to program develop-
ment packages.

● In micro communications, the most likely direction over the fore-
cast period will be towards the integration of communications functions
into basic configurations, with embedded modem functions or (in the
case of large-organization products) built-in networking interfaces,
and with software bundled. The result will be to curb the market for
discrete communications packages, which will become a declining pro-
portion of the market for much of the period, notably after the intro-
duction of new low-end and large organization micros in the 1984-86
timeframe.

These trends will have major implications for the unit shipment
and dollar volume growth rates of the micro package market. The
phenomenon will be less one of price declines on existing types of
packages, (market structure is unlikely to remain still enough for
this to occur) than of overall declines resulting from the integration
of existing package functions into larger programs (i.e. reducing
unit shipments and average per micro expenditure on software), and from
user-friendly operating systems allowing users to perform a wide
range of processing tasks for which they would previously have had
to make additional software expenditures. The net result of this
will, however, be the same -- that the total package market will
experience a slow-down of growth relative to the expansion of the
micro hardware base.

The phenomenon can be described as one of "concentration". Integrated packages such as the Lotus 1-2-3 and Context MBS, for example, offer a range of functions which would cost 2 or 3 times more if they were to be purchased as discrete packages, and the software developer's task over the forecast period will become increasingly one of developing larger and more complex programs with increasingly user-friendly operating modes. While there will clearly remain a place for the discrete specialized package, the micro software industry is thus likely to follow developments in hardware -- more powerful mechanisms in a smaller and cheaper "box".

Micro Packages as a Commodity Business

The current trend towards user-friendliness is resulting in an increasing number of sophisticated program operations being integrated "into the box" rather than requiring performance by the user -- the obvious examples of this are the LISA and VisiON operating systems, which allow complex operations to be performed by cursor movements and simple typed commands. This has been recognized as inevitable if the large numbers of users who are not technically competent are to be introduced to micros, but it will also radically alter product differentiation criteria over the forecast period. Products such as Ashton-Tate's dBase II, for example, have been kept on best-seller lists by their attractions to the technically competent user, and there is still a strong emphasis in much of the market on "building a better mousetrap" (i.e. developing a technically superior product). This will become increasingly difficult to achieve when in many cases operation modes have been reduced to simple command sets and

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the use of cursors, and marketing factors such as control of distri-
bution, visibility and vendor credibility will become correspondingly
more important.

This trend can be seen as already well-established in the
dominance of a handful of vendors and products in most segments of the
business and systems and programming markets. While the more skilled
and enthusiastic micro user may be prepared to "shop around" for
micro packages, the average retailer is less likely to carry a broad
range of packages for any given application. Apart from the sheer
inconvenience of ordering, the inventory management problems of most
retail outlets are considerably reduced if the focus is kept on a
limited number of products that can be relied upon to move well.
As the micro market moves towards the less skilled user and away
from the original generation of micro users, this trend is likely
to be accentuated -- a small businessman, for example, is likely
to settle for an accounts receivable or inventory package that has
a reasonable track record and some visibility rather than for new
and less well-known products.

The games market has always been more of a commodity business
than other types of micro packages, but even here there is clearly a
trend in the direction of shorter product lines and heavier marketing
actions. This is being generated by:

1) The increasing role on non-specialized consumer retail channels
(e.g. department stores; grocery, drug and convenience stores; con-
sumer electronics outlets, bookstores, toy and game stores, video
stores and the like) in software distribution. Whereas the specialty

computer or retail store may carry product lines running into the
hundreds, these outlets are more likely to focus on shorter lines
with a greater emphasis on in-store displays and promotions, and the
vendor who can deliver this stands a better chance than the smaller
firm that cannot. Moreover, both consumers and retailers have proved
to be sensitive to advertising and merchandising strategies which
create visibility and consumer recognition for games packages, and
vendors are unlikely to spread budgets for this over long product
lines (the approach adopted by CBS Software is probably typical of
future trends: the company markets a short product line with a common
brand identification: K-Razy Kritters, K-Star Patrol, etc.)

2) The market entry of the large entertainment conglomerates such
as CBS, Thorn-EMI, MCA and Warner Brothers (which already has a pre-
sence in this market via Atari). Besides extensive distribution net-
works and product lines in records, tapes, video programming and other
entertainment-related areas, these groups also control highly visible
entertainment themes -- film titles and formats, television shows
in particular. There are already the beginnings of a trend towards
the use of these themes to sell games products, and this is likely to
increase over the forecast period, with vendors generating game "im-
pulse buys" by associating products with well-known topics.

The net result in all sectors over the forecast period will thus
be towards the use of marketing rather than technical factors by
vendors to differentiate products, resulting in greater concentration
of sales in any given product type or market segment in a relatively
small number of market leaders.

Market Size and Growth

As Exhibit 1-1 shows, the market for micro software packages will close at slightly over $1.5 billion in 1983, increasing to more than $2.7 billion in 1984 as new hardware lines enter the market and around $4.6 billion in 1985. After that, we anticipate a slow-down in growth rates as a result of the trends towards lower per micro software spending described above and of greater price competition in consumer markets. Over the forecast period, there will also be a number of major structural shifts in the market, principally:

• A shift in growth in business markets towards vertical packages in the 1984-88 timeframe as participation in these areas by major micro vendors occurs and as micro-based systems begin to erode the conventional small business systems markets. Standard small business packages will maintain a fairly consistent market share over this period, with growth in small business micro usage and higher per in-stallation software values being counterbalanced by erosion of demand for standard applications by customized vertical software. The market share decline of general business packages over this period is a function of the growing proportion of this market accounted for by integrated rather than discrete packages. Over the 1988-90 period, however, this position will be reversed as penetration of micros into small businesses slows after the 6-7 million unit level, and as large organization micro use continues to expand as a function of high-er stabilization levels (assumed to be in the 15-20 unit range) and as micro lines phase out stand-alone word-processor bases and spread to less well-paid white-collar workforces.

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Exhibit 1-1

1983-93 Overall Market Forecast

$ Millions	1983	1984	1985	1986	1987	1988	1990	1993
General Business	613	1,035	1,550	2,337	3,407	4,650	5,640	6,700
Small Business	164	270	415	645	865	845	770	485
Vertical Packages	86	210	700	1,350	2,200	2,600	1,900	900
	863	1,515	2,665	4,332	6,472	8,095	8,310	8,085
Games	540	995	1,555	1,850	2,495	2,920	4,030	5,300
Misc. Personal	15	22	30	46	48	41	36	39
Systems/Programming	73	87	153	243	258	218	224	275
Communications	26	35	41	48	56	80	92	50
Educational Institutions	50	88	139	214	306	402	633	910
	1,567	2,742	4,583	6,733	9,635	11,756	13,325	14,659

As % Total Market	1983	1984	1985	1986	1987	1988	1990	1993
General Business	39%	38%	35%	34%	35%	40%	42%	46%
Small Business	10%	10%	9%	10%	9%	7%	6%	3%
Vertical Packages	6%	7%	15%	20%	23%	22%	14%	6%
	55%	55%	58%	64%	67%	69%	62%	55%
Games	35%	36%	34%	27%	26%	25%	30%	36%
Misc. Personal	1%	1%	1%	1%	1%	-	-	-
Systems/Programming	5%	3%	3%	4%	3%	2%	2%	2%
Communications	2%	1%	1%	1%	1%	1%	1%	-
Educational Institutions	3%	3%	3%	3%	3%	3%	5%	6%

(Percentages may not add due to rounding)

● The declining market share in dollar terms of game packages over the 1983-88 period as a result of more intense price competition and more sophisticated products (meaning fewer unit purchases). In addition, as described earlier, this market is likely to undergo a slow-down in user purchasing levels as the growth in the home hardware base slows and the market consists increasingly of additions to existing bases of games rather than initial purchases. This trend is likely to be reversed towards the end of the period by sales of higher-priced and new types of product running on hybrid micro-videodisc player hardware.

● A relatively small market share of non-games "personal" software compared to games products, due to this constituting a single- rather than repeat-purchase market, and attributable also to the more limited appeal of more sophisticated types of "home" applications.

● A largely stable market share for systems and programming packages, as market trends towards user-friendly software and away from technically competent users counterbalance stimuli to this market resulting from the introduction of new operating systems and languages over the 1985-87 and post-1990 periods.

● A decline in the market share of conventional types of communications packages as these functions are increasingly integrated into micro hardware/software functions, with some growth being maintained by sales of packages allowing access to specialized database services.

● Constrained growth in the educational institutions market, due to funding shortages in most of this sector, but with major increase in dollar volume occuring towards the end of the forecast period as

software-based educational materials begin to be accepted for main-
stream teaching applications rather than (as at present) for special-
ized courses and activities normally conducted during periods set
aside for "discretionary" or "creative" activities. Healthy markets
for educational software will, however, be apparent over the forecast
period for games-type applications for younger age groups and adult
or "continuing" education (i.e. purchases by and for adult indivi-
duals), but with slackening growth rates during the second half of
the forecast period as initial purchases give way to a market composed
more of package additions to existing bases.

Exhibit 1-2

Composition of Educational Package Market

($ Millions)

	1983	1984	1985	1986	1987	1988	1990	1993
Institutions	50	88	139	214	306	402	633	910
Games	15	35	70	160	300	390	480	450
Continuing Ed.	-	1	3	4	5	5	6	6
	65	124	212	378	611	797	1119	1366

Changes in Supplier and Distribution Structures

During 1982-83 several trends have become apparent that will
have major implications for the package market supplier and distri-
bution structures:

1) The rapid emergence of a class of independent software product
distributors acting as middlemen between retail outlets and vendors,
and offering pre-selected product lines and a variety of other marketing

services to software package outlets.

2) The first appearance in the market of the distribution arms of the major entertainment companies and of other types of consumer product distributors (notably rack-jobbing specialists), reflecting the increasing penetration of micro package lines into consumer retail outlets, and the beginning of cooperation with the independent software distributors in putting software lines into these channels.

3) The first use of OEM distribution channels for micro hardware by IBM and other major systems vendors.

4) The emergence of specialized procedures in the educational and vertical market sectors involving development of software products by combined teams of sectoral specialists and program development personnel.

5) The first experimental usage of down-loading technology for delivery of software packages to retailers.

6) Increased efforts by major systems vendors (notably IBM and DEC) to establish control over the movement of their micro hardware/software products into large organizations.

The results of the developments will be to:

1) Reduce the importance of specialized computer and software retail outlets as distribution channels for micro software packages: large organizations will increasingly be served by direct volume sales, and systems houses will also become a major means of reaching small business (particularly vertical) markets. Similarly, the expansion of low-end micro bases will see a greater volume of software package business going through consumer retail channels.

2) Change the "balance of power" within the package market, intro-
ducing distributor organizations such as Softsel and SKU as major
players. Vendors will have to deal increasingly with these groups
to ensure adequate distribution coverage for their products, enabling
the latter to exact increasingly favorable terms and in the long term
acting against supplier concentration by providing assistance to smaller
firms in product development and marketing and by helping them to
obtain large-scale distribution for new products. The increasing
tendancy towards the use of specialized development teams in several
sectors will also lead to a tendency for software developers and groups
to deal directly with larger distribution organizations (independent
software distributors, micro vendors, consumer distributors and,
in the educational field, publishing companies) rather than going
through established software houses.

3) In the case of down-loading technology, change the pattern of
vendor-to-retailer delivery in this direction. In addition, down-
loading is also likely to have a major impact on the market for games
software during the second half of the forecast period, with services
offering an interactive games capability via CATV networks and/or
the public telephone system being extended to down-loading of games
direct to consumers.

Architectures and Operating Systems

Major changes will occur in this area also, with the original
generation of single-tasking operating systems (CP/M, Apple DOS,
TRS-DOS and the proprietary operating systems of low-end micro and the
more powerful high-end micro vendors) giving way over the decade to

multi-tasking systems allowing the use of single-station, multi-window and multi-user formats on micro systems. This trend has started to become apparent during 1983, with the introduction of extremely user-friendly multi-window systems such as Apple's LISA and VisiCorp's VisiON and vendor commitments to UNIX-type operating systems. The trend is likely to be accelerated over the 1985-86 timeframe with the shift to 32-bit micro architectures moving into the industry mainstream, although it would be unwise to "pick the winner" until IBM has been heard from, probably during 1984 or 1985. In the mean-time, the latter's PC-DOS/MS-DOS operating system is rapidly emerging as the industry standard for single-tasking systems, a reflection both of IBM's current success in this market and of widespread anti-cipation that the company will dominate the micro field. The result is that PC-DOS/MS-DOS is becoming increasingly popular both as a principal system on new products (e.g. Texas Instruments' Professional and Compaq's portable) and as an alternate operating system (e.g. DEC's Rainbow and systems from Japanese vendors). In the case of the latter, PC-DOS/MS-DOS is rapidly supplanting CP/M as the main choice of alternate operating system for single-tasking applications. The most likely scenario for the forecast period is as follows:

• Movement of simplified versions of multi-window and cursor systems onto low-end micro systems targeted at the home market, with the first products using this approach appearing in late 1983 or during 1984.

• Penetration of multi-user systems into the small business market beginning in late 1983 and gathering momentum over 1985-86 with the

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industry shift to 32-bit micro architectures. Initial penetration
of this market is more likely to be by multi-user formats than by
the multi-window and cursor approach favored by Apple on LISA, pro-
vided that standard small business applications such as accounting,
payroll and inventory management can be adequately implemented in
these environments. In the longer term, probably in the 1985-88
timeframe, the two approaches are likely to be merged for this market.

● Market segmentation between single-tasking operating systems (with
PC-DOS/MS-DOS the standard here by the 1985-86 timeframe) and multi-
tasking systems, with the former still preserving a place on low-end
micros under $100 and on systems targeted at the low end of the bus-
iness market (i.e. micros in the $3,000 to $10,000 bracket intended
for small business use and portables) until at least the second half
of the forecast period. Multi-tasking systems will make their appear-
ance on large organization units, $600 low-end micros (multi-window
format derived from the Xerox PARC approach) and on more powerful
and expensive micros for the small business market (UNIX-type systems).
During the second half of the forecast period, the ability of multi-
tasking systems to handle multiple workstations will cause micro-
based systems to erode most of the conventional small business
systems market. By 1990 it is probable that current micro lines will
have been extended upwards by most vendors to cover small business
markets currently served by systems running at upwards of $100,000.

● During the second half of the forecast period, multi-tasking can
be expected to phase out single-tasking systems altogether, although
this is not likely to be complete until the end of the period (i.e.

1993), and a substantial package market will remain for single-tasking
systems, serving existing installed bases of these. In addition,
if the micro industry continues to show the same pace of generational
change it has demonstrated to date, it is probable that during the
1990-93 period it will have entered a third generation of operating
systems. These will probably combine multi-tasking approaches with
the ability to handle mass data storage media based on videodisc tech-
nology, with initial implementation on hybrid micro/videodisc player
hardware for the home market and on bases of large organization
intelligent workstations. This will enable a merger of multi-tasking
and Local Area Network technologies to be realized which will allow
individual workstations to operate as part of an integrated local
system incorporating decentralized mass-storage capabilities.

SECTION 2   BASIC ISSUES

Introduction

The microcomputer market can be considered to have started in 1975, with the shipment of the Altair 880 -- in its first year, the market consisted of about 4,000 unit shipments. Apple Computer was formed in 1976, and Tandy shipped its first TRS-80 in 1977. VisiCalc, which did much to popularize micro use for business applications, was intro- duced in 1979.

In short, the micro hardware and software business is of very recent origin, and it was not until 1979-80 that it began to move away from a hobbyist-type market to one in which business applications predominated. By 1982 micros in the Apple II, TRS-80 and comparable CP/M machines bracket were shipping at a rate of over 2,000 units per day, with upwards of 625,000 sold in the course of the year -- during 1983, the number of units shipped is likely to exceed 1 million. Moreover, the original micro bracket, consisting of machines typically priced at more than $3,000 has been joined by the "home" or low-end micro at less than $1,000 -- during 1982 these cleared the 1 million shipment mark, and in 1983 more than 3 million are likely to be sold. At the other end of the scale, more powerful micros capable of handling multiple workstations began to appear in the late 1970s, and by 1982 were starting to encroach on the market for conventional small business systems pioneered by firms such as Wang, Basic/Four and DEC. This market itself had only begun to take off in the early 1970s and, prior to the arrival of micros, had been enjoying the fastest growth in the computer industry.

If the micro market originated in 1975 and the first large-scale vendors arrived in 1976-77, other companies likely to be major factors in this market over the next decade have appeared even more recently. IBM entered in late 1981; DEC in 1982; the Japanese vendors, whose domestic market only began to develop on any scale in 1980 (i.e. with several years lag relative to the U.S.) are also at an early stage of development in product and marketing strategies; and American Bell (soon to be AT&T Information Systems) is likely to be in the market in late 1983 or 1984, adding another new and major player.

The same phenomenon can be observed in micro software -- since the mid-1970s the major players in this market have been independent, specialist developers of software for micros and (to a lesser extent) the hardware vendors themselves. (Over 1982-83, however, a new range of companies has begun to enter). With the expansion of the micro market into the small business systems area, systems integrators are becoming a factor; in the games market, the success of micros has brought in a variety of players, including the large entertainment conglomerates with interests in movies, TV and video programming, music and publishing and suppliers of toys and conventional types of games; in the field of educational software, the publishers of educational books, periodicals and other materials and the audio-visual suppliers are moving into micro software.

All of these factors make it difficult to use past experience in projecting the future of the market, making it vitally important to identify and evaluate emerging trends -- this study attempts to do just that.

Pace of Change in the Micro Hardware/Software Field

The speed of development in the micro field has been remarkable, even by the standards of the electronics industries. Besides the growth in shipments of micro hardware and software over the last eight years, there has been a rapid pace of development in both hardware and software products. Micro architecture, for example, has seen a shift from 8-bit to 16-bit models within six years -- the time between the introduction of the Altair 880 and the IBM PC -- and a move to 32-bit (in the sense that sufficient products will be on the market to force the majority of vendors to follow suit if they wish to remain competitive) seems likely in the 1985-86 timeframe.

Operating systems are seeing a similar evolution, albeit on a slightly longer time scale: single-tasking operating systems can be effectively dated to 1975 when CP/M became available. The shift to multi-tasking systems for business applications appears to be starting this year, and will probably gather momentum in the 1984-85 timeframe, while extremely user-friendly operating systems such as that of LISA are also likely to become the market standard by 1986, merging with conventional multi-tasking software technology en route. The end result will be a generational change within a ten-year period (compared with six years from 8-bit to 16-bit micro architecture, and four-five years for 16-bit to 32-bit).

The same phenomenon can be observed in applications software. In the area of business software, for example, most of the major categories were established in 1979-80 (i.e. word processing, spreadsheets and data base management systems) and the current market leaders appeared at that

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time -- VisiCalc and Wordstar were introduced in 1979 and Ashton-Tate's dBase II in 1980. By 1982, these products had been expanded into compatible families that included such functions as graphics generation, planning and scheduling and communications, and in 1982-83 the first integrated business packages (Lotus 1-2-3 and Context MBA) appeared which combined all of these functions into a single product. Close on their heels are Apple's LISA and Visicorp's VisiON, which go one better and combine these functions with an extremely user-friendly operating environment. The generational shift here can be reasonably put at four to five years.

Similarly, games have seen some major changes: the original "2D" x-y graphics format which characterized micro games from the mid 1970s on was joined in 1979 by "3D" vector graphics, with the two now merging. Moreover, games products are also seeing what is clearly a major generational shift, with the introduction of packages allowing users to create their own games formats, and with various other "paintbox"-type products which allow users to "draw" or "paint" with computerized graphic images. This development is likely to merge with the trend towards LISA-type operating systems, which offer very similar capabilities, and with videodisc technology (the first videodisc-based micro games products have also appeared in the 1982-83 timeframe). Overall, the generational change here can be put at six to seven years.

This phenomenon should not, however, be overstated -- 8-bit systems, for example, will likely retain a place in the micro market long after the leading-edge products have moved to 32-bit, and single-tasking operating systems such as CP/M are likely to represent a significant

installed base well into the second half of the decade. However, the intensity of competition in micro hardware and software will probably keep the leading-edge in both moving faster than in most other sectors of the computer industry. This suggests that in the forecast period covered by this study the micro market will see at least two generational shifts in most sectors, occurring on a four to seven year timescale: The next few years seeing a shift into a second (in most software areas) or third (in micro architecture) generation of product, and a further shift towards the end of the decade, taking software into a third generation and micro architecture probably into the 64-bit range.

Technical Competency and Micro Usage

One term which is used extensively in this study is "technical competency", and while difficult to define, it represents a phenomenon that is recognizable to most people involved with this market. Systems such as Apple's LISA and a growing number of business and program development packages are designed for users who do not fit this description, with man-machine interfaces reduced to a level of con- siderable simplicity (e.g. the use of cursors, simple English language commands).

Among micro users, the "elite" is constituted by those who do some or all of their own programming, although there are also clearly large numbers of users who, while they do not program, are nevertheless comfortable with sophisticated applications programs. As a rule of thumb, this group can be defined by two factors: they feel comfortable choosing hardware and software at retail outlets, with no more advice and consulting than is normally provided by these and/or order packages

by mail based on their own assessments of product quality; and they do not normally require outside assistance in mastering new applications (they are also typically readers of micro user magazines). This group has traditionally been the backbone of the micro hardware and software markets, but as the decade progresses and more user-friendly systems are introduced, they will form a decreasing proportion of the micro user base.

The Hardware Background

From the original desktop "personal computers" of the 1970s, the microcomputer has developed into a wide variety of devices, ranging from the Timex-Sinclair 1000, last seen retailing at around $30, to powerful 32-bit machines with multi-tasking operating systems going for over $20,000 and capable of outperforming many minicomputers and conventional small business computer-based systems. In passing, micros have also become portable (a category pioneered by Osborne, but which has since attracted a wide field of vendors) and have begun to be attached to conventional terminals (DEC's VT 160 and IBM's combined PC/3278 workstation). Overall, it is clear that the original micro market is in the process of "self-destructing"; having introduced the use of discrete microprocessor-based intelligence to a wide range of other markets and products, the desktop "personal computer" market is likely to become an increasingly minor component of the whole micro spectrum over the forecast period. Rather, we are seeing a segmentation of the micro market into categories discussed in the following sections.

<u>Low-End Micros</u>:   Defined as being units less than $1,000 (although with peripherals the total can be much larger), and generally known as "home computers", this group consists primarily of such products as the Commodore VIC-20, Atari 400/800, Texas Instruments 99/4A, Timex-Sinclair 1000 (originally the Sinclair ZX 81) and Tandy Color Computer. These models began first to be marketed in the 1979-80 timeframe -- initial movement was slow, with only 150,000 units shipped during 1981, and with prices typically in the $500-$1,000 range. Early in 1982, however, Texas Instruments launched a price war and mass-marketing campaign on its 99/4A which obliged the other low-end vendors to follow suit -- by the end of 1982 upwards of a million units had been shipped and some unit prices were below $100.

Of all the micro markets, this has proved the hardest to call -- TI, for example, predicted a more than 9 million unit market in 1983, with results that are well-known. The final level for 1983 is likely to be in the 3-4 million unit range, probably around 3.5 million. Where it goes from there will depend on two factors:

1) The extent to which low-end micros phase out the market for video game machines, which has been moving extremely fast (in 1982 more than 8 million units and upwards of 50 million ROM catridges were shipped, with 1983 levels likely to exceed 14 million and 80 million respectively). Current projections suggest that about half the U.S. television house-holds will have one of these machines by the 1987-88 timeframe, equivalent to an installed base of 35-40 million units, but during 1983 there have been strong indications that low-end micros are seriously eroding

this market. Several low-end micro vendors have initiated "trade-in"
programs on games machines for their systems -- Atari, with its extensive
interests in video game hardware/software (it has upwards of 70% of
the market), has to date resisted this trend and attempted to keep its
video game and low-end micro lines separate, but it cannot continue
to do this indefinitely. A merger of these two markets is thus likely
over the 1984-87 timeframe, which could put the low-end micro base
as high as 25-30 million by 1988.

2) The success of the "$600 low-end micro". With existing low-end
micros disappearing into the less than $100 bracket, and taking profit
margins down with them, vendors in this market are starting to refocus
on more powerful machines pitched at the $500-600 level. Epson's HX-20,
which appeared last year at $800, was an early example, but Coleco
has more recently set the trend with its $600 Adam, introduced in June
1983. TI's 99/8, IBM's "Peanut" and one of ATT's low-end lines are
also likely to be pitched at this level, offering 16-bit, 64K RAM units
with communications capabilities bundled into the system and possibly
software also. In contrast to the current generation of low-end micros,
which seem to be used primarily for playing recreational games, vendors
are likely to emphasize educational, home finance/management and business-
related functions for these machines.

It is thus probable that by the end of 1984, the low-end micro
market will have split out into two segments, with the under-$100
range taking over the market role of video games machines, and with a
layer of products offering more sophisticated capabilities in the
$500-600 range.

<u>Portables</u>: Initiated by Osborne Computer with its $1,800 CP/M-based
Executive, which was introduced a couple of years back, the portable
market has now brought in more than 20 vendors with systems in the
$1,000-2,000 range, and the bulk of the Osborne Executive has given
way to more compact "briefcase" computers such as those offered by
Kaypro and (IBM-compatible) Compaq. This market has also been enjoying
spectacular growth, with more than 300,000 units likely to be shipped
in 1983.

The problem posed by portables is exactly where they stand in re-
lation to the rest of the micro market -- buyer profiles are very similar
to those that have characterized the market for desktop micros.
Portability aside, it is also clear that they are used extensively for
processing at home, both business-related and personal, and it is still
not entirely clear as to how much of the attraction of portables is
due to their portability and how much due to the fact that they offer
reasonably powerful processing capabilities more cheaply than most
desktop models. To date, they have not proved much of a threat to the
desktop market, but this is not likely to last. While the large-
organization market is unlikely to be seriously hurt (and may even
benefit -- IBM's scenario of the executive or manager taking work home
on his micro rather than in his briefcase, and transferring it to the
desktop he keeps at work the next morning, seems a plausible one), the
market for micros for the self-employed or very small business is
likely to be affected. Over the 1983-88 timeframe it is probable that
portables will decline in price to bring them in line with the $600
low-end micros, and these two markets will have effectively merged by

the end of the first half of the forecast period (i.e. 1988) and possibly even before.

Small Business Systems: A term originally coined to describe higher-end and more expensive systems such as the Wang 2200, IBM S/3X and comparable computers from companies such as MAI (Basic/4), DEC, Burroughs and the like, small business systems began to appear in force in the early 1970s and provide processing power based on conventional mini-computer-type architectures for small businesses. Systems in this category range from $10,000+ to more than $100,000 fully configured, and are normally sold and supported by direct sales forces of the vendors and/or systems houses to whom they are supplied on an OEM basis. Usually, the sale, installation and support of these systems involve a fair amount of "hand-holding" from the organization with which the small business deals, and this has kept many conventional small business systems viable at a time when micro-based systems offer theoretically superior capabilities for a much lower price. The classic example of this has been IBM S/23 Datamaster, an 8080-based system that was intro-duced in 1980. Although technically inferior to the company's 8088-based PC, it has continued to generate healthy business for IBM largely because its price (typically in the $12,000-18,000 range) allows sufficient margin for IBM staff to provide the kind of "hand-holding" that potential users know they are not going to get with the much cheaper PC.

This factor has to date constituted a barrier that has largely isolated the older types of small business computer from competition

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from micros.   However, this is clearly changing, and during 1982-83
several trends have become apparent:

1) The small business systems vendors have been obliged by the prospect
of a threat from micro-based units to themselves introduce comparable
products.   Among others:

IBM undercut its S/23 (base price $4,000) with its PC (base price
$1,500).

Wang undercut its 2200 series, one of the most successful small business
systems in the market (base price $8,000), with its Professional
Computer (base price $2,500).

DEC undercut its Datasystem series (base price $10,000) with its
Professional 300 (base price $4,000).

Burroughs undercut its B90 (base price $8,000) with its B20 (base
price $4,000).

NCR undercut its I-9010 (base price $6,300) with its Decision Mate
(base price $2,500).

2) The major computer companies have begun to channel their micro lines
into the same type of OEM distribution channels that they have to date
used for conventional small business systems.   Vendors of high-end
micro systems such as Altos and Zenith had for several years been using
OEM distribution channels, but they have clearly had much less impact
than that likely to be caused by larger computer firms.   IBM's intro-
duction of its Value-Added Dealer program for the PC in February 1983
was particularly notable, with the PC now being supplied to vertical
market specialist systems houses in such areas as insurance, agriculture,
manufacturing, financial institutions and scientific and engineering

systems.   DEC and Burroughs have also targeted OEM channels as major

distribution mechanisms for their micro lines.

3)   Two of the three main vendors of desktop micros, Apple and Tandy,

both announced systems targeted squarely at this market.   Apple's LISA

(base price $10,000 for a bundled system) attempts to resolve the

"hand-holding" problem by using an extremely user-friendly operating

system which theoretically does away with the need for "hand-holding"

altogether, while Tandy's TRS-80 Model 16 (base price $5,000 but with

typical configurations running in the $7,000-12,000 range) runs Xenix

(as does LISA, as an option).   A similar move from IBM is inevitable,

probably in the 1984-85 timeframe.

These developments are clearly sounding the death knell of the

conventional small business system, and the industry shift to 32-bit

micro architectures and multi-tasking operating systems over the

1985-86 timeframe will complete the process.   The result will inevitably

be to expand the micro software market, as micro-based systems are

increasingly installed where previously conventional small business

systems would have been selected.   Average software value will most

likely be much higher than is the case for most micro installations

currently going into small businesses, and while this type of installa-

tion will represent a numerically small component of total micro shipments,

it will have the effect of increasing average software value for the

market as a whole.

<u>High-End Micros</u>: High-end micros are defined for the purposes of this report as microcomputers sold through specialized computer retail outlets or (in the case of large organizations) the direct sales forces of vendors. This cateogry was created by the Apple II, TRS-80 and comparable CP/M-based systems, and has now been joined by the IBM PC/XT, DEC's Rainbow and Professional and Texas Instruments' Professional. These systems will normally retail at upwards of $3,000 for a purchase including initial sets of peripherals and software and more powerful systems such as the IBM XT, DEC Professional 300 and Fortune 32:16 may run to more than $10,000 fully loaded.

This market too is in the process of separating out into several segments. In 1983, probably more than 40% of high-end micros sold will be going into large organizations for use as workstations by individual managers, professionals or technical specialists. As this market is likely to grow considerably longer than that for small businesses before reaching stabilization, by the end of the decade it is likely to represent a considerably larger proportion of shipments than is presently the case. In the process, however, the large organization micro is likely to be altered from its present form.

This process can be considered to have begun in 1982-83, with actions by the two largest computer companies, IBM and DEC. Both organizations:

1) introduced products which allowed existing terminal bases to become intelligent by "bolting on" micros: DEC's VT 160 uses the company's popular VT 100 terminal, and IBM's "Rover" allows a stripped-down PC to be attached to its 3278 terminal.

2)   launched programs designed to recapture control of shipments of their

micros into their large accounts (in IBM's case, responding to cases

such as the purchase of a bulk lot of 1,000 PCs by United Technologies --

from ComputerLand).

In the longer term, both these two and a wide variety of other systems

vendors (including ATT, the PBX vendors, suppliers of office automation

systems and just about all the major computer companies) are aiming to

tie intelligent micro-based workstations into broader communications

systems, including Local Area Network (LAN) and/or central switching,

filing and multi-media capabilities.   Integrating micro lines into

terminal bases is an obvious first step that has the advantage of

cutting out competitors from accounts with large terminal bases from

a given vendor.   In the 1984-86 timeframe current solutions are likely

to give way to what can be described as "intelligent communicating

workstations" tied into LANs and/or central switching systems and

offered by the larger systems vendors as part of broader communications

scenarios.

Stand-Alone Word-Processors and Executive Workstations: Developing in

parallel with microcomputers have been two other types of systems

which, while technically similar (i.e. discrete microprocessor-based

units),   have been designed and conceived with different aims.

Stand-alone word-processors have been around since the late 1970s

from word-processor vendors such as Lanier, NBI, CPT, Micom (Philips

Information Systems) and A.B. Dick, but the current generation of

products was spurred by IBM's Displaywriter, an 8086-based system

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introduced by the company in January 1981 and selling at upwards of $8,000. Notable responses include DEC's DECmate ($6,500+), Wang's Wangwriter ($6,500+), and comparable "second generation" products from most of the competitors in this market.

Originally targeted at typewriter upgrades for small businesses, these lines proved difficult to keep under control. IBM's Displaywriter in particular started to turn up in large numbers in its large accounts, and Wang, after abortive efforts to protect the low end of its main word-processing line, the WPS/OIS series, accepted the inevitable and also began to sell the Wangwriter in bulk lots to large organizations. Moreover, no sooner had these vendors put their products out on the market than they began to face competition from the microcomputer lines that they had themselves introduced (IBM in particular was sufficiently concerned about this to introduce a deliberately underpowered word-processing package, EasyWriter, on the PC). The simple fact appears to be that in most cases vendors were reacting to the fast unforeseen growth in the micro market, and did not have the time or the awareness to integrate plans for microcomputers with other workstation lines. Since 1981 most of them have consequently been engaged in various efforts to maintain distinctions between their product lines, and it is clear that the majority have recognized that the popularity and market potential of micros is considerably greater than that of stand-alone word-processors. The probability is thus that after the life-cycle of current stand-alones is complete (or as far along as it is likely to get), these models will be phased out in favor of a common hardware line also

covering what is currently the high-end micro market. Again, IBM can be expected to lead this move, phasing over from both its present PC and Displaywriter lines to a standard workstation line.

The net result will thus be that the next product generation in micros will phase out the stand-alone word-processor market as low-end micros will takeover the video game market. The timing of this and implications for the micro software market are discussed in Section 3.

Executive workstations will doubtless go down in history as an excellent idea that was run over by the development of the micro market before it got anywhere. The concept of the Executive Workstation was first popularized by Xerox with its 8010 Star workstation, and at last count there were a dozen workstations so described. The idea was that micro technology could be used to provide powerful, specialized systems aimed at senior corporate executives and enabling them to achieve advances in productivity and creativity by sophisticated and highly user-friendly software (the approach was later used in systems such as Apple's LISA and Visicorp's VisiON) and sheer processing power. The idea failed to catch on, largely because the Star was too expensive ($20,000+ loaded) and because ordinary personal computers running such standard applications as spreadsheets, DBMS and word-processing proved to respond adequately to the requirements of most large organization management and executive personnel. As discussed in Section 3, the concept is clearly still a valid one, but it will not be creating a separate class of workstation product distinct from mainstream micro lines.

Merger of Microcomputer and Videodisc Technologies: By the end of the
forecast period we also anticipate that the micro field will see an
effective merger of this technology with that of videodisc, resulting
both in widespread use of videodisc peripherals on micros and in hybrid
hardware systems.

With a storage capacity running into the gigabyte range, videodisc
technology offers a considerable potential for storage of computer data
as well as the audio/video data for which videodiscs are largely used
at present.   There are upwards of a quarter of a million videodisc
players in U.S. households, mostly supplied by MCA/Philips, using
Philips' LaserVision system first introduced in 1978, and RCA, using
the company's Capacitance Electronic Disc or CED system introduced in
1981.   A third system, Video High Density or VHD, was backed but never
introduced in the U.S. by a consortium including Matsushita, Thorn-EMI
and GE.

Besides its applications in consumer entertainment, videodisc
technology has also begun to be used in industrial and commercial
training and educational products, and many of the leading computer
firms (notably IBM and several of the Japanese companies) have also
experimented with videodiscs as computer storage media.

The introduction of videodisc technology into the micro field is
likely to be one of its earliest applications to the computer field,
largely because vendors of larger systems have too much invested in
storage media to wish to introduce products capable of replacing these
at lower cost and with greater efficiency, and because the momentum of

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videodisc-based products in consumer markets is already well-advanced. As in other areas of micro hardware/software, the development of the market is likely to be shaped less by purely technical factors than by the actions of major players. In a situation of intense competition (likely to be very much more the case towards the end of the decade, when current micro markets begin to slow down), it will prove impossible for vendors to ignore or control popular developments once they have been introduced, and this is likely to be the case with videodisc, with the Japanese firms forcing the pace.

The shift to video/computer systems has already begun in Japan, as recent products by Sony and Matsushita indicate. For an industry that is starting to suffer levelling in markets for conventional video-cassette recorder/players, and which has to date enjoyed only limited success in the world micro market, the shift makes excellent sense. Unsurprisingly, U.S. companies have been seeking tie-ups with Japanese firms with strengths in this area, with IBM again leading the field -- the company is particularly interested in combinations of home computer and videotext technologies with videodisc equipment, and this is likely to be reflected in IBM product lines by the 1985-86 timeframe.

By the end of the forecast period, we anticipate that, at least in the home market, combined videodisc/micro systems will be a key feature.

Operating Systems Trends

Although there are more than 50 operating systems on the market, the vast majority of package business occurs in seven systems -- Apple's Apple DOS, Tandy's TRS-DOS, IBM's PC-DOS (a.k.a. MS-DOS), CP/M and the

proprietary systems used by Atari, Texas Instruments (TI) and Commodore.
In addition, there is a substantial market for low-cost packages
(typically in the $10-$20 range) for the Timex-Sinclair TS-1000.

Apple DOS, TRS-DOS and CP/M have been around since 1967-77 and all
three systems have built up a substantial program base (with Apple's
the largest of the three). The base for low-end systems began to develop
on a large scale in 1981-82 with the explosion in the low-end micro
market, and the base for the IBM PC is increasing fast. Fueled by
a widespread recognition that IBM is going to dominate the micro market,
vendors have been targeting the PC (notably for business packages, but
increasingly also for other applications) on a scale that can only be
described as a "gold rush". The PCs software base is clearly going to
overtake even that of Apple by the second half of the decade.

In addition, the entry of DEC into the market has added another
major candidate with its P/OS operating system on the Professional 300
(although its smaller model, the Rainbow 100, supports CP/M - 8080 and
8086/88 variants - and MS-DOS). Although it will probably be at least
a year before the company gets its marketing act together, it is clearly
going to be a major player in the business market.

In the longer term, the industry is also clearly going to see a
shift to "second-generation" operating systems -- these are going to be
multi-tasking systems operating on the more advanced 16-bit machines
and the 32-bit machines that will start to appear in the market in force
in the 1985-86 timeframe.

The MS-DOS "Gold Rush": According to IBM, the PC has acquired over
2,500 programs since its introduction in the Fall of 1981, but this is

obviously the tip of the iceberg, and this will remain one of the fastest growing areas in the micro package market. The IBM PC is becoming the industry standard (this belief has become so widespread as to be a self-fulfilling prophecy) and as such is going to replace CP/M in this role for single-tasking systems. Four developments are particularly relevant in this context:

1) The growth in IBM-compatible micro systems. The greatest action is currently in portables, largely because IBM does not yet have a product in this area, with the Compaq moving well and a comparable product due from Osborne. In addition, several recent major market entries in the desktop bracket are significant -- Texas Instrument's Professional Computer, DEC's Rainbow 100 and NEC's Advanced Personal Computer (APC) all operate under MS-DOS, as do 20+ other products, and Fujitsu and Hitachi are also clearly going to follow the IBM-compatible path.

2) The IBM PC is well on its way to becoming an international standard. Although several other U.S. companies have also targeted overseas markets (notably Commodore), none of them have the resources to match IBM world-wide -- the XT, for example, was introduced simultaneously in 22 countries with ComputerLand's backing, and IBM is going to be an earlier and even more forceful entrant in the later-developing markets of foreign countries than it was in the U.S. Japan, which is targeted by IBM with its 8086-based Kanji-processing 5550 is not much of a prospect, but the market for PC-compatible packages in Engligh-speaking countries and countries for which foreign-language versions of English language software can be developed is clearly an attractive one -- U.S. developers take note of IBM's difficulties in obtaining third-party applications in Europe.

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3) The IBM PC is in the process of dominating the large organization market (a point recognized by VisiCorp, Lotus Development Corporation and Context Management Systems, all of whom have introduced "second-generation" integrated applications packages aimed at corporate managers) using both its visibility and sheer marketing clout.

Moreover, its introduction of the PC into IBM's VAR program in February 1983 and its planned expansion of PC distribution to include other business channels indicate the company is putting its micro line squarely into the territory previously occupied by its small business systems line (S/23 through S/38). That kind of commitment on IBM's part suggests that the PC line may be extended upwards to occupy the bracket currently occupied by the S/23 and potentially also the S.34, or at least that software portability from the existing PC/XT line will be provided to a replacement small business system. This could be very good news for vertical market developers.

4) It is clear that IBM plans a low-end micro entry, probably in the $500-600 bracket. If this is software-compatible with the existing PC (which it probably will be, at least partially), it is going to open up major games and other home applications markets, and will doubtless be good news to those who have had the perseverance and/or faith in the PC to develop games for it.

The end result is going to be that IBM's own shipments and those of the compatibles are going to establish an MS-DOS/PC-DOS hardware base that will probably consist of upwards of 50% of the micro market by 1986.

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Other Single-Tasking Operating Systems: The proprietary systems (Apple DOS, TRS-DOS, the low-end micro systems particularly) are clearly not going to disappear, although their attractiveness for applications packages will vary:

Apple DOS, which already has the largest program base, will decline in importance -- the Apple II line is getting old, and the company's focus over the next few years will be on its LISA and "Machintosh" lines. Moreover, Apple will be meeting IBM head-on in business markets, an encounter it cannot possibly win.

TRS-DOS will also decline as a proportion of the overall market, although Tandy's proprietary distribution channels via the Radio Shack chain will help insulate it from competition.

Low-end micro systems like Atari, Commodore and TI are all likely to continue to be forces in the market, although it is less clear that Timex-Sinclair will be able to stand the pressure on profit margins generated by the price wars in low-end micro hardware.

CP/M, the nearest thing to an industry standard to date, is also well-established. As of May 1983, more than 120 micros from 80+ vendors were CP/M-compatible, and the majority of stand-alone word-processor units in the market also support CP/M. Moreover, Digital Research's implementation of CP/M for 8086/8088 environments, CP/M-86, has helped give the system a new lease on life. CP/M is available as an option of all of the leading micro models.

In the long term, however, CP/M is going to be the main casualty of developments in the micro market -- the next few years are going to see

the beginnings of a shake-out in the micro industry which is inevitably going to favor the larger micro vendors with their proprietary systems. Moreover, the emergence of MS-DOS/PC-DOS as the new standard in single-tasking systems is seeing an increasing number of vendors introduce this as their primary system or as an alternative option to a proprietary system where previously CP/M would have been used for this purpose.

By the second half of the decade, CP/M will be experiencing a rapid decline in growth, although ironically this will increase its attractiveness as a package candidate for some vendors -- as discussed in the following section, the large existing CP/M installed base and the faster growth of other sectors has meant that CP/M environments are less competitive in many product areas, and are more attractive candidates for smaller companies who do not have the resources or the visibility to fight it out with the larger business software houses.

UCSD-p is currently the "dark horse" in single-tasking operating systems. The system was originally developed at the University of California, San Diego, and has been marketed commercially since 1979. It has not been particularly successful, and would not be a factor in the market if IBM had not shown considerable interest in it. It was introduced as an alternate operating system on the PC (along with MS-DOS/PC-DOS and CP/M-86), and more recently IBM has reaffirmed its commitment to the system for the PC -- something it has not done for CP/M-86. Moreover, IBM has also extended UCSD-p to the Displaywriter, and DEC has intro-duced the system as an alternate on the Professional 300. This bears watching.

The "Second Generation" Stakes: The shift to multi-tasking operating systems over the next several years is an inevitable one given the history of the computer industry to date: systems of increasing com-plexity have always moved onto smaller pieces of hardware.   Essentially, multi-tasking systems permit the simultaneous execution of more than one operation on a computer, and to date developers have moved this capability in two directions: i) multi-user systems, allowing more than one user to run operations on the micro at the same time and ii) single-user. In this implementation, a user can run multiple sets of operations on a single workstation -- typically, a multi-window approach will be used, with the various operations in progress being reflected in "boxes" or "windows" on the same CRT.

        To date, two approaches have attracted the most attention: those using the UNIX operating system or its derivatives, and those using multi-window and "mouse" technology originally developed at the Xerox Palo Alto Research Center (PARC).

A.   UNIX-Type Systems: Originally developed at Bell Laboratories for the purpose of ATT internal programming applications, UNIX was first made generally available in 1975, when Western Electric began granting licenses to academic institutions.   It enjoyed considerable popularity for software development applications in academic and scientific environ-ments, and circa 1981 began to be widely touted as the "second-generation" operating system for 16- and 32-bit micros, thereby arousing much contro-versy and attention.   The process by which UNIX came to be a "burning issue" in the industry has not exactly been a rational one, but it would be dangerous to think that it should not be taken seriously -- to those

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who have followed such subjects as office automation, digital PBXs, local networking and videotex, it is a familiar phenomenon. ("Hype" has to be taken seriously in this industry.)

UNIX is far more powerful than conventional single-tasking systems such as Apple DOS, MS-DOS, TRS-DOS and CP/M, offering multi-tasking, a hierarchical file structure and a very flexible command structure. It also comes with powerful editing and formatting, assembly and debug capabilities and a variety of system utilities including file transfer and pattern search programs.

In short, it is a highly-sophisticated, complex system. Programmers love it. Unfortunately, it has also tended to reduce less technically competent users to confusion and occasionally hysterics, and in its present form requires extensive training and familiarization -- hardly an asset at a time when the whole micro market is moving away from the technically competent user base.

Moreover, ATT's control over the system has caused problems. Whereas UNIX licenses used to be given away more or less free to academic and scientific institutions, Western Electric now charges $43,000 for the UNIX source code, $25,000 for distribution rights and also levies a royalty on sales. The industry is still dependent on Western Electric's periodic enhancements (the latest of which, System V, was some four months late in being delivered earlier this year) and the forthcoming entry of ATT itself into the micro market in 1984-85 raises doubts as to the degree to which the company will continue to supply the system to all comers.

Despite these drawbacks, UNIX has attracted considerable support. An early proponent was Microsoft, whose own version of the system, Xenix, is generally regarded as superior to the original for micro applications. To date, only a dozen companies have announced UNIX/Xenix-based micro systems, but Xenix is one of two alternate operating systems on the Apple LISA (the other being CP/M), and in April 1983 Microsoft announced that it would be marketing Xenix system packages via retailers for LISA and the IBM PC in the fall of 1983. Another early UNIX supporter, Altos Computer, has also announced a program to market its own and third-party Xenix applications packages to dealers.

B. The Xerox PARC Approach - LISA and VisiON: The second major area of multi-tasking development was pioneered by Xerox and has focused on the use of multiple, user-adjustable windows displayed on a single screen. The approach was combined with the use of a cursor or "mouse" and the result was to produce an extremely user-friendly interface comparable to that used on the more sophisticated computer-aided instruction (CAI) software. The PARC approach was first used in the Xerox 8010 Star, introduced as an executive workstation. Although the Star evoked favorable responses from many of the managers who came to use it, it was killed by its price -- starting at $20,000 and with a fully-loaded system running up to $40,000.

The ball was, however, picked up by Apple and (more quietly) VisiCorp who introduced the 68000-based LISA and IBM PC-compatible VisiON systems respectively. Unlike Xerox, which regarded the Star's primary market as high-level corporate executives, both Apple and VisiCorp have targeted

their systems at the small business principal and corporate middle manager, groups notoriously shy of micro technology, and for whom the extreme ease of use of the systems are likely to have more tangible benefits. There are also more of them.

Of the two systems, <u>LISA</u> is the more impressive. The system is extremely easy to learn and operate. (Apple claims that unsophisticated users can become proficient on the system in 20 minutes -- this is clearly an exaggeration, but LISA is still by far the easiest system on the market to learn and use.) The system comes complete with a fully integrated family of applications packages including LISACalc (spreadsheet), LISAList (DBMS), LISAWrite (a medium-level WP package), LISAProject (scheduling and planning), LISAGraph (business graphics) and LISADraw (user-created graphics). The hardware includes a 12" 364x720 black and white CRT and memory expandable to 16MB of hard disk. A basic configuration with 1MB of main memory, two 5¼" diskette drives and a 5MB Winchester and the six applications packages runs to $10,000. Xenix and CP/M are also supported.

<u>VisiON</u> offers similar features (or will offer, once VisiCorp has finished debugging it), including user-adjustable multiple windows, a "mouse" and an integrated applications family. According to VisiCorp, the system will operate on an IBM PC with at least 256K RAM, dual double-sided floppies, a color/graphics card and preferably an external hard disk.

C. <u>Other Candidates</u>: In addition to the operating systems described in the previous sections (and several other UNIX clones), there are at least 13 multi-tasking systems available and more on the way. The

majority of them are, however, intended for specialized uses, and only two have yet emerged as serious candidates for the mainstream commercial market. These are:

MP/M. An extension of CP/M into a multi-tasking system. MP/M has been developed by Digital Research in two variants: MP/M II for 8080 and Z80-based micros and MP/M-86 for 8086/88-based machines (i.e. the IBM PC and compatibles). Although supported by systems from more than 20 vendors, MP/M has not to date attracted support from any of the major micro companies -- IBM does not seem to be interested, although several of the larger Japanese vendors reportedly are.

Oasis. Developed by Phase One Systems, Oasis also comes in two variants for Z80-based systems (Oasis) and 8086/8088 and 68000-based systems (Oasis-16). Although unlikely to emerge as a mainstream standard, it will probably carve out a small but useful market niche on the more powerful 16-bit and later 32-bit systems as an alternate operating system to UNIX/Xenix.

D. Conclusions: The winners and losers of the "second-generation" stakes would be hard to call with certainty -- in the final analysis, it will depend on what the heavyweights do, and the three largest, IBM, ATT and (to a lesser extent) DEC have still not made their positions clear. The following points can, however, be made:

1) UNIX/Xenix has developed considerable momentum. Besides the vendors of UNIX/Xenix-based micro systems, it has drawn support from the semiconductor community, notably Motorola (for the 68000) and Intel (for the 80286), and from Microsoft. Moreover, the recent agreement

between Western Electric, National Semiconductor, Intel and Motorola to develop UNIX-type software suggests that this is going to be the keynote of ATT's micro strategy. In addition, UNIX/Xenix software is likely to start becoming widely available through dealer and retail channels during late 1983/early 1984, and this will inevitably increase its chances of early acceptance, particularly as its vendors claim to have solved the problems of user-friendliness (time alone will tell whether this is true, but in the meantime, it will help establish the system's distribution presence). Whatever the system's merits or demerits, it is clearly the leading candidate in the multi-tasking stakes, with Xenix likely to be its main implementation in micro environments. As the emergence of CP/M as an industry standard in the last 1970s demonstrated, acceptance (above all the feeling among vendors that a system is <u>likely</u> to become a standard) can become a self-fuelling process, and this seems to be occuring with UNIX/Xenix.

IBM has still not been heard from, however, and while most of the company's development efforts are focusing on 80286 and 68000-based Xenix systems, it is clear that a final decision has not yet been made -- IBM is still looking for a viable alternative.

2) The UNIX/Xenix and PARC approaches are likely to merge -- Apple and Microsoft are moving in this direction, and the combination of UNIX/ Xenix's power and the extreme user-friendliness of PARC-type systems is clearly too attractive to be ignored.

3) The movement towards extremely user-friendly systems using multiple screen windows, "mice" and CAI-type software appears irresistible.

In addition to the Apple and VisiCorp operating systems, Context
Management Systems' MBA (an integrated applications package targeted
at less technically competent business users and described in the
following section) also uses multiple windows, and is being rewritten
for VisiON. Although likely to be successful in business markets,
PARC-type systems are also clearly going to hit the low-end micro market
in the near future, and they are obviously substantial attractions for
leisure and educational uses. Apple's LISADraw, for example, offers
a capability not far removed from the more sophisticated computer games
and children's educational packages, allowing users to create their
own graphics formats. The element of "play", as Apple has pointed out,
features strongly in the whole LISA system. While this may not be
something that the average business would feel comfortable with, it
clearly touches deep psychological nerves on the part of both children
and adults, and Apple's system on the "Mackintosh" and Microsoft's on
the "Peanut" will do much to popularize this approach for the consumer
market.

In the business market, the ease of use of PARC-type systems is
an obvious advantage, but the approach is also likely to appeal by its
ability to handle multiple problems simultaneously -- this allows users
to explore the relationships between different sets of data and/or
potential problem solutions presented graphically on the same screen.
In this sense, the multi-window/"mouse" approach allows for a greater
degree of creativity in business problem-solving than conventional
systems.

SECTION 3   <u>BUSINESS SOFTWARE</u>

Worth $850 million in 1983 (i.e. around 55% of the total market)
business software still constitutes the backbone of the micro package
business. For this study, we have divided business packages into three
main groups: general business (principally spreadsheet calculators,
word processing packages, personal data base management systems (DBMS),
business graphics and scheduling and planning packages), small business
(principally accounting packages and products for such applications as
mailing list management, payroll and inventory control and sales manage-
ment) and vertical business (packages for small business applications
which are designed for the specialized formats and requirements of
particular types of business).

These categories reflect the lines of segmentation that have emerged
since the micro package market began to develop in the later 1970s --
general business packages will typically be used by a wide variety of
individuals in different types of business environment, while small
business applications will normally be employed only by principals of
small firms. Vertical packages are even more specific, and are destined
for use by principals of a given type of small business.

<u>Overview of Business Market</u>

Precise definitions of the micro business market are difficult to
make realistically. For example, it is clear that the majority of small
business principals who use a micro do much or all of their processing
at home, and as they are often technically competent and generally com-
fortable with a micro, they will also use it for a variety of other

applications. Moreover, the dedicated micro user frequently enjoys using his or her machine, and drawing a line between their use of a micro for business applications and, say, programming, writing letters or maintaining files, poses problems. Consequently, it is convenient to class as "business" packages applications such as word processing and DBMS which are frequently used for purposes other than gainful employment.

With that caveat, micro business markets can be divided into two main groups, according to whether the user is a principal of a small business (including the self-employed) or is an employee of a larger organization. In the case of the latter, the micro will be used as an individual workstation in a business environment in which the main computer is a mainframe or mini-based or conventional small business system. In this case the micro will typically be used for personal business applications and/or for the processing and filing requirements of a small organizational unit.

The Small Business Market

At a conservative estimate, there are around seven million small businesses in the U.S.A. which are potential micro users. (It is normal to use the U.S. government statistical classification which defines a small business as one that employs fewer than 20 persons.)

The small business sector shows enormous diversity -- the largest single categories are agricultural enterprises (2.4 million), retailers (1.6 million) and engineering/construction (475,000), but even these can be broken down into smaller classifications, and categories such as personal services (500,000 firms) and wholesaling (220,000) contain a wide variety of different types of firm.

Exhibit 3-1 shows major categories of small business.

Any legally-constituted business has to fulfill certain basic requirements in terms of the collection and processing of data -- accounting, payroll (if the firm has employees), and frequently the maintenance of data bases on customers. In organizations which sell or handle products, there will also be a requirement for inventory control and for such functions as order processing, sales analysis and the like. However, sales of packages for these types of applications constitute only a minor part of the market for business packages -- less than 28% of the business package market as a whole according to our calculations. It is clear that a substantial proportion of the sales of business packages to small business users fall into the "general business" category and, as discussed later in this section, this appears to be a reflection of the user profile in terms of age, education and technical competency rather than of the profile of the business itself.

This factor makes it dangerous to play "numbers games" with the size of the small business market. The success of micros in small business environments to date is not necessarily representative of how the market as a whole will develop over the remainder of this decade because the small business environments that have come to use micros are not representative of the whole -- "mom and pop" outfits in many lines of business, for example, are unlikely to feel comfortable with VisiCalc. It is clear that resistance to micros in the small business sector will increase as the "technically competent user" market slows down and future growth becomes dependent on sales to less sophisticated

Exhibit 3-1

U.S. Small Business by Type

(thousands)

Agriculture	2,400
Engineering/Construction	475
Architects/Civil Engineering	75
Contractors	400
Retail	1,600
Restaurants/Bars	300
Gas Stations	150
Pharmacies	100
Liquor Stores	45
Wholesale/Distributors	220
Durables	120
Non-durables	100
Transportation Services	100
Professional Services	
Accountancy	85
Advertising/PR	40
Brokerage	35
Legal Services	75
Real Estate/Property Mgt.	130
Financial and Insurance	
Banks	14
Credit Unions/S&Ls	20
Insurance Agencies	60
Health Care	
Medical Offices	150
Dental Offices	110
Veterinary Offices	20
Dental/Medical Laboratories	15
Hospitals/Nursing Homes	22
Other Services	
Automotive Services	230
Misc. Business Services	125
Maintenance and Repair	200
Personal Services	500
Hotels/Motels	40
Rental and Leasing	35
Printing and Publishing	30
Entertainment	12
Total	6,743

users. (IBM, for example, estimates that of the seven million+ small firms in the U.S.A., no more than four million are potential micro users.)
<u>The Large Organization Market</u>: This large organization category also possesses definitional problems, and the business side is commonly referred to as the Fortune 500, Fortune 1000, Fortune 1500 etc. market. Like the small business market, it is prone to "numbers games." For convenience, we shall define this market as being constituted by the Fortune 1500 -- the largest 1,000 U.S. manufacturing firms and largest 50 or 100 companies in commercial banking, life insurance, financial services, transportation and utilities. As the smallest firm on the most recent Fortune list ran around $200 million in revenues, it is clear that most major U.S. companies are covered. To this group may be added public sector organizations which between them account for upwards of 6.5 million employees, although tight budgetary conditions and (in the case of the federal government) the centralized procurement procedures going through the General Services Administration (GSA) represent a different marketing environment from that of the Fortune 1500 market.

Exhibit 3-2 shows total employment for these sectors and estimated breakdowns by occupational category.

Of these occupational groups, several can be dismissed as potential micro users for the first half of the forecast period covered by this study. With a base system for most high-end desktop models running at upwards of $3,000 in purchase price and with hidden costs in training, time taken to become productive and the like (which as a rule of thumb can be expected to run as much as the cost of the hardware itself), large

Exhibit 3-2

Potential Micro User Bases in Large Organizations

	Fortune 1500	Federal Government	State/City Government
Executives	75,000	18,000	9,000
Middle Management	2,450,000	350,000	130,000
Sales Representatives	675,000	-	-
Business Professionals	235,000	35,000	20,000
Technical Professionals	650,000	120,000	45,000
Other Professional	-	230,000	215,000
Data Processing Staffs	225,000	35,000	25,000
Total	4,310,000	788,000	444,000
Supervisory	1,500,000	120,000	80,000
Clerical/Office	6,650,000	825,000	620,000
	8,150,000	943,000	700,000
Totals	12,460,000	1,733,000	1,144,000
Total All Sectors	15,337,000		

organizations are inevitably focusing on higher-paid salaried staff.
The vast majority of production workers, secretarial and clerical workers
are unlikely to be getting micros this side of 1988. In the longer term
however, as discussed in Section 2, the probability is that most major
vendors of stand-alone word processing systems will merge these with
micro lines after the present product generations, with the result that
during the 1988-1993 period, micros will increasingly replace stand-alone
units. Short of a revolution in office organization (which seems
unlikely), this group is still likely to be engaged mainly in word
processing by the end of the forecast period. Clerical staffs are
unlikely to be serious candidates for micro usage until the latter part
of the 1990s.

The main focus of micro usage in large organizations for the fore-
seeable future will be in the six highest-paid groups:

A. <u>Executives</u>: These will typically be senior management responsible
for the operations of major corporate functions or of the company as a
whole. They tend to be decision-makers to a far greater extent than
most other salaried staff, and are typically positioned at the apex of
reporting structures. This group became the focus of efforts by vendors
of "executive workstations" in 1980-1981 (notably Xerox with its Star
workstation, the first micro-based system to use the extremely user-
friendly software format developed by Xerox PARC and later used on the
LISA and VisiON operating systems). These efforts were largly unsuccessful,
and deserved to be -- they were based on a fundamental misconception of
the executive's role and work patterns. Executives normally rely heavily

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on other people for input, and because they operate at a high level, they do not do much data processing. By the time an issue has reached executive level, the odds are that it has already involved large amounts of data being boiled down at lower stages of the decision-making hierarchy, and it would be a fruitless task for executives to start verifying assumptions, doing their own projections and the like. (More-over, most planning-related processing is handled on host systems, with larger data handling capabilities and into which many of the necessary parameters and data have been fed on an ongoing basis.) While executives are increasingly using micros, there is no clearly identifiable type of "executive" application distinct from other business applications, and we doubt that any distinctive type of "executive" package or system will emerge on any scale.

Exhibit 3-3

Prime Micro Candidates in Large Organizations

Executives	102,000
Middle Management	2,930,000
Sales Representatives	675,000
Business Professionals	290,000
Technical Professionals	815,000
Data Processing Staffs	285,000
Total	5,096,000

B. Middle Management: As Exhibit 3-3 shows, this is by far the largest group of prime micro candidates in most large organizations. They tend to be implementers of decided courses of action rather than decision-

makers, and much of their work is routine and involves the supervision of others. Many attempts have been made to deal with the issue of management productivity, none of them particularly convincing -- in any large organization, much of the workload of management involves coordination activities of one sort or another (meetings, telephone calls, preparation and study of documents) which do not lend themselves easily to automation. The gains in productivity that can be realized by having a manager doing his own document drafting on a micro are miniscule in relation to the average manager's workload, and the more successful projects for the use of micros by management have largely ignored this aspect.

The primary use of micros by middle management -- whether initiated by the individual manager or pressed upon him by a larger corporate program -- revolves around using the micro as a tool for studying problems and rehearsing potential solutions by the individual, rather than around using a micro as an integral component of office procedures: it is used at times when the manager would otherwise have been working alone, figuring out problems or just plain thinking. As several of the large corporate users interviewed for this study pointed out, the gains in productivity in having managers use micros are largely intangible, and it is recognized that they are more useful in promoting "management creativity" than in reducing paperwork.

C. <u>Sales Staffs</u>: These will typically be in contact with customers, and in most lines of business can be expected to spend a fair amount of time out of the office. They are not typically micro users, and it is

seldom felt by them or their employers that there is much to be gained
from having them use micros. The only exception to this is in the use
of portable computers where there are advantages to be had from regular
down-loading of data from sales staffs "on the road." Software require-
ments for this group are likely to be limited, with a handful of "staples"
such as word processing, DBMS and communications packages meeting most
needs. To date, this has not been a growth area for micro use, although
during the second half of the decade it is likely to be very much more so.

D. Business Professionals: These will typically be holders of a non-
technical professional qualification (e.g. accountants, attorneys) and
will form part of specialized departments or functions within corporations.
While they may be micro users, they do not usually constitute a market
for distinctive types of software -- their main data processing activities
will be undertaken on host-based systems with the relevant data bases
and programs (e.g. financial, personnel) and their usage of micro packages
tends to involve the same aims and applications as for middle management.

E. Technical Professionals: These are normally persons whose job
revolves around technical activities (e.g. scientists, engineers) rather
than management functions -- as such, they should be distinguished from
persons with a scientific or engineering background whose current
activities are primarily managerial. These have been early and competent
micro users in most large organizations, although their usage patterns
and software requirements tend to constitute a distinct category, with
many of them doing their own programming rather than buying packages.

F. <u>Data Processing Staffs</u>: These will typically be involved in system operation and maintenance and in programming activities for mainframe or mini-based hosts. These have also been early users of micros, although mainly for hobbyist rather than business applications. It is notable that the vast majority of large organizations using micros have preferred to standardize on generally-available applications packages rather than customized micro software, and there has to date been no distinct market for the large organization DP professional micro user. This may change in the second half of the decade with the availability of high-powered micros capable of running host programs and handling COBOL, and which are likely to be used for programming activities for host systems (with the added advantage that this will help reduce host workloads).

To date, the majority of large organization micro users have tended to follow a distinct pattern -- regardless of function, they are typically younger (having begun their business careers since the beginnings of the micro industry or in the years immediately preceding), with higher education and/or a technical background. They have tended to buy their own systems or have initiated purchases of small numbers by departments at a relatively low level of the organizational hierarchy. They are also typically technically competent, and comfortable making hardware and software purchases at retail stores. In most respects, their profile is that of the more micro-oriented small business principal.

There are, however, clear signs that this is beginning to change, and that as large organizations initiate micro usage programs, they are moving from this type of user towards their less sophisticated counter-parts, and that "one-off" purchases are increasingly giving way to centralized procurement.

General Business Software

This area, still by far the largest part of the business package
market (more than 72%), consists of packages used mainly by the techni-
cally competent user and available from most computer and software retail
outlets. Most of them are immediately recognizable -- spreadsheet
calculators (with VisiCalc still by far the most visible and best-selling
product), word processing and DBMS packages have formed the staples of
the business market since its inception. In addition, two new categories
have emerged over the last few years, business graphics (mostly spread-
sheet-compatible packages for the generation of graphic data from the
latter) and scheduling and planning systems allowing more complex
business planning exercises to be performed.

This market can be said to constitute the "mainstream" of the
business package field, and despite growth in specialized packages
targeted at particular types of business user (e.g. large organization
managers, unsophisticated small business principals, vertical business
users), it is likely to remain healthy for the forecast period, with a
continuous stream of technically competent users coming onto the market
as exposure to micros at home and in educational institutions increases
during the decade.

General business packages are used by a wide variety of persons,
and cover both large organization and small business markets. Indeed,
the market has to a large extent "defined itself," with packages such
as spreadsheets and DBMS proving attractive in themselves rather than
for the performance of specific job-related tasks -- to this extent, the

general business market is more realistically described in terms of personality type rather than business function.

Types of General Business Packages: These types of packages fall into several categories which are described on the following pages.

A. Spreadsheet Calculators: Currently the single largest category of micro business software packages (and one that has caught on rapidly), the spreadsheet calculator was originally created by VisiCorp (then known as Personal Software) with its VisiCalc program, which more than any other product popularized the micro for business applications. Its success was based on linking the "number-crunching" capabilities of the micro with the visual format (columns and rows) normally used for the presentation of figures in business, and providing the user with the means of recreating whole sets of interrelated figures by altering one or more of the variables used in the original calculation.

The spreadsheet calculator has always appealed strongly to the more technically competent micro user, although many small businessmen and corporate managers feel less comfortable with it.

VisiCalc is still the best-selling spreadsheet calculator on the market (and indeed one of the best-selling products in the package market as a whole), and its longevity can be attributed to the fact that it is a common purchase for new micro users who have observed other people operating it, had it recommended to them or heard word-of-mouth endorsement. Initially available for the Apple II, it has since been extended to the IBM PC, TRS-80 I/III, Atari 800, Commodore PET and CBM and HP 85 and 125.

The popularity of VisiCalc inevitably produced a crop of imitators, notably for CP/M environments, where no clear leader has emerged among the 20+ packages available for spreadsheet calculating under this system. Moreover, all of the major business software houses have introduced their own products.

Most of the spreadsheets on the market can be described as "second-generation" products. Although most use spreadsheets of about the same format and size as VisiCalc (63 columns x 254 rows), enhancements have been added in spreadsheet complexity (e.g. the handling of multiple cells and multi-window formats), formatting and sorting capabilities (e.g. use of standard financial formats, text editing, report generation) and user assistance (typically Help menus and prompts).

Apart from VisiCalc itself, leading products include Multiplan (Microsoft), a medium-level spreadsheet second only to VisiCalc in popularity and recently endorsed by IBM for its PC, SuperCalc (Sorcim), a popular CP/M package, Microplan (Chang Laboratories), CalcStar (Micro-Pro), PeachCalc (Peachtree), Financial Planner (Ashton-Tate) and Perfect Calc (Perfect Software). Prices range from $250 (VisiCalc) to $500, depending on the degree of sophistication offered -- the three market leaders (VisiCalc, Multiplan and SuperCalc) are all in the $250-$300 bracket, with the remainder spread above and below (ranging from CalcStar for CP/M systems and the IBM PC at $145 to the more sophisticated Microplan, intended for finance professionals, at $495).

Although there are a dozen or so visible spreadsheet products, the market is actually very concentrated -- VisiCalc and (to a lesser extent)

MultiPlan dominate the Apple and IBM environments, and many of the other products owe much of their success to CP/M sales.

Two trends are apparent:

1) The IBM PC is rapidly being targeted as the prime host for spreadsheet calculators by a large number of vendors, a reflection of this product's runaway success for business applications. However, this market area is already dominated by VisiCorp and Microsoft (IBM's favorite software company), and the growing success of integrated management packages such as Lotus 1-2-3 and Context MBA, described later in this section, for the PC will keep competition fierce. Prospects for vendors targeting the PC in the $250-$300 bracket are not promising, although there is no shortage of triers.

2) This market area is largely sewn up by the larger business software houses, with the marketing and distribution leverage to push their products. The smaller companies have tended to be successful only when targeting less competitive environments (notably CP/M) and/or when offering packages with more or less sophistication than the norm, and priced accordingly.

B. Word Processing (WP): More than any other type of general business software application packages, word processing programs sell "across the board" to all types of business micro users. One of the effects of this has been that just about every type of micro software company has become involved in this market area: all of the micro vendors have their standard packages, as do most of the business software houses and 75+ other firms, including "garage shops," educational specialists and even games companies.

Whereas the earliest WP packages for micros were often somewhat primitive, many of the packages currently available are the equal of programs available on dedicated WP systems. Although micro-based systems still cannot handle the text volume of dedicated word processors, they have come to incorporate the same kind of features as the latter. (WordStar, for example, provides editing features such as automatic text justification, automatic paragraph indent and undent, simultaneous printing/editing and page break displays; the insertion, deletion, movement and copying of text and features such as boldface type, double striking, underlining, strikeout, subscripts/superscripts, variable character and variable line height, for $495.)

WP packages tend to be enhanced frequently by their vendors, and most of the leading products are at least on their second generation; for example, Applewriter begat Applewriter II, Superscribe begat Screenwriter II, EasyWriter begat EasyWriter II.

Despite the profusion of products in this market area, a handful of packages account for most of the market -- MicroPro's WordStar alone accounts for around 25% of the market. WordStar covers Apple, IBM PC and CP/M environments, but otherwise the leading products tend to be associated with single-vendor environments: Apple's Applewriter II and Sierra On-Line's Screenwriter II for the Apple II, Information Unlimited Software (IUS)'s Easywriter II for the IBM PC, and Tandy's Scripsit and Superscripsit for the TRS-80.

The market has traditionally been divided into three areas: high-powered systems (e.g., WordStar, Select Information Systems' Select

package), medium-level packages (e.g., Applewriter, Screenwriter, EasyWriter) and low-end packages for micros such as the Atari 400/800, TI 99/4A and Commodore VIC-20. The medium-level packages (typically in the $100-$200 bracket) are adequate for most light-duty applications such as non-standard letters, memos, messages and drafting. However, the success of WordStar, a $495 high-powered package, has been striking -- it is clearly being purchased by a large number of users who could probably get by with a package for half the price.

Whatever the causes of WordStar's success, it has set the standard at the high-end -- few vendors have targeted above it (Select, at $595 is the most expensive of the major products, and incorporates extensive user training and assistance features). Most new entrants have targeted in the $100-$350 range, offering relatively simple packages and/or various text enhancements.

Micro computer WP packages have also followed dedicated WP systems in adding enhancement modules for such applications as spelling correction and report generation: thus, for example, WordStar begat SpellStar and Report Star, Scripsit begat Scripsit Spelling Dictionary, and EasyWriter begat EasySpeller. Most of the major WP packages have acquired fold-ins from their original vendor or from third parties, and a number of specialized dictionary products have also appeared (e.g., legal and medical dictionaries).

C. Data Base Management Systems (DBMS): Data base management system packages, as the name indicates, allow large amounts of data to be organized coherently and accessed selectively by a defined set of parameters.

Unsurprisingly, given the wide variety of different types of data bases maintained in business environments, DBMS technology has been incorporated in a large number of applications packages -- notably mailing list, inventory control, scheduling and more recently "personal productivity" applications such as calendaring, remembering where one left things, etc. The situation has also been confused by a growing number of DBMS packages allowing users to create their own data base formats, and which are clearly ending up in a variety of applications.

Traditionally, most DBMS packages conformed to fairly standard and pre-written formats (e.g., mailing list, appointment scheduling, inventory control). The exceptions were products such as Ashton-Tate's dBase II, which allowed users to create their own formats, but which were typically used by more technically competent users. More recently, however, vendors have been pushing DBMS packages for "across-the-board" applications (e.g., VisiCorp's VisiFile and Silicon Valley Systems' List Handler are offered as appropriate for everything from mailing list and inventory control applications to Christmas card lists).

The most realistic distinction that can be made is to divide DBMS packages into those used for conventional small business applications (primarily mailing list) and those used for "personal business" applications, which will tend to overlap several market areas, including employees of large organizations, non-business users and technically competent small businessmen and professionals. The conventional small business applications will be discussed in the following section.

1. <u>Personal Business DBMS Packages</u>: The use of DBMS technology for personal business applications was pioneered by Ashton-Tate's dBase II, a complext relational data base program initially for CP/M environments (but since extended to the IBM PC, Xerox 820, HP 125 and NEC APC). Written in assembly language and requiring technical competency by the user in creating his or her own formats, and with a list price of $700, dBase II has nevertheless remained in best-seller lists since its intro- duction in 1980, and is highly regarded by the "elite" of micro users.

Most of the other products that have been successful in this market area require less sophistication and are lower-priced, typically in the $100-$250 bracket. Among the leaders: Stoneware's DB Master (Apple), VisiCorp's VisiFile and VisiDex (Apple and IBM PC), Tandy's Profile II (TRS-80), IUS' EasyFiler (IBM PC) and MicroPro's InfoStar (CP/M and IBM PC).

The success story in this area recently has, however, been two packages by Software Publishing Corporation under the logo PFS (Personal Filing System). The two packages have been on best-seller lists since their introduction -- PFS:File is a basic DBMS program, and PFS:Report provides sorting, formatting and printing capabilities for report generation. Priced at $125 and $95 respectively for the Apple II and $140 and $125 for the IBM PC, the two have tended to sell together. The "personal filing" concept has also had its imitators. More than a dozen products are advertised as "personal DBMS" packages, although technical differences between these and mainstream DBMS packages are not significant, and several have followed PFS:File and PFS:Report into the

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best-seller lists.   Notable are Perfect Software's Personal Filer and Relational Systems' Personal Pearl.

As in spreadsheet and WP packages, the larger business software houses and (to a lesser extent) micro vendors are market leaders, although smaller firms have to date accounted for most of the successful "personal DBMS" packages (a success that owes more to marketing the concept than to differences in software structure).

D.   Business Graphics: Business graphics packages which successfully emerged on the coattails of spreadsheets, convert data transferred from files or manually entered into graphic form on a micro CRT, using bar graphs, area graphs and/or pie charts.   In addition, most packages provide the ability to output on a graphics printer (although the quality is typically short of what most managers would require for presentations or final-form documents -- resolutions of only 250 x 190 for 8 bit and 640 x 480 for 16 bit micros are the norm).

Most of the movement in this market area has been in packages capable of generating graphics from spreadsheet or DBMS files -- notable products include VisiCorp's VisiPlot (Apple, IBM PC) and Desktop Software's Graph N'Calc (IBM PC), both VisiCalc-compatible, and Software Publishing's PFS:Graph, compatible with the same company's PFS:File.

Prices are typically in the $125-$200 bracket.

E.   Scheduling and Planning: While scheduling and planning software is a little-developed area at present, this category contains a variety of packages for complex planning applications, typically involving time and/or resource projections for multiple scenarios.   There are more than

30 packages currently available covering such applications as business modeling, forecasting and simulation, PERT management and less formalized project management systems. Most of them are more complex to operate than all but a small minority of managers would feel comfortable with -- they are typically specialists' rather than managers' programs.

The only packages that have achieved some visibility, although still far from best-seller lists, are extensions of spreadsheet programs, notably VisiCorp's VisiSchedule (VisiCalc-compatible at $300) and Chang Laboratories' Microplan Consolidation Module (Microplan-compatible at $295).

Prices are typically in the $250-$500 bracket, although high-powered systems may run upwards of $1,000.

The Move Towards Integration: The most obvious trend in general business software over the last twelve to eighteen months has been a move towards the integration of the various business functions for which micro users would previously have used separate packages. This has been reflected in two developments -- the emergence of file-compatible product families and more recently the appearance of "integrated management packages" combining a variety of functions in a single package. Business product families are listed in Exhibit 3-4.

A. Product Families: Development of business micro use has been away from single-application use (principally spreadsheet and WP packages) towards the use of a variety of different packages on the same micro, with much of the new growth being in areas such as DBMS packages, business graphics and communications. Justifiably, user demand has been

<u>Exhibit 3-4</u>

<u>Business Product Families of Leading Vendors</u>

<u>VisiCorp</u>

VisiCalc*	Spreadsheet	$250
VisiTrend/ VisiPlot	Bus. Graphics	$300
VisiFile	DBMS	$250
VisiDex	DBMS	$250
VisiSchedule	Scheduling	$300
VisiWord	WP	$375
VisiSpell	Dictionary	$225
VisiTerm	Communications	$100

<u>MicroPro</u>

WordStar*	WP	$495
SpellStar	Dictionary	$250
MailMerge	Text Editing/ Mailing List	$250
CalcStar	Spreadsheet	$145
InfoStar	DBMS	$495
DataStar	DBMS	$295
ReportStar	Report Generator	$350

<u>Information Unlimited Software</u>

EasyWriter* (Marketed by IBM)	WP	$200
EasyWriter II	WP	$350
EasySpeller	Dictionary	$225
EasyMailer	Mailing List	$ 70
EasyPlanner	Spreadsheet	$250
EasyFiler	DBMS	$400

<u>Software Publishing</u>

PFS:File*	DBMS	$140
PFS:Report	Report Generator	$125
PFS:Graph	Bus. Graphics	$140
PFS:Write	WP	$140

(Prices for IBM PC -- Apple II differ)

<u>Peachtree</u>

Peachtext*	WP	$500
Spelling Proofreader	Dictionary	$300
Mailing List	Manager	$375
PeachCalc	Spreadsheet	$375

<u>Sorcim</u>

SuperCalc*	Spreadsheet	$195
SuperWriter	WP	$295
SpellGuard	Dictionary	$195

* "Flagship" package.

for packages capable of interacting with ("folding into") their existing applications software, allowing data to be transferred between them. VisiCalc "fold-ins," notably for graphics generation, appeared early on from third parties, and with upwards of 300,000 VisiCalc packages sold by yearend 1982, this installed base has proved an attractive target. So much so that VisiCorp has introduced its own series of "fold-ins" for such applications as DBMS, graphics generation, scheduling and communications.

This approach has also been adopted by other vendors with one or more best-selling products, with the result that "installed base leverage" has come to the micro software industry; the idea being that an initial user investment can be leveraged by selling compatible products.

Not all products in such families have been successful -- VisiCorp's VisiFile, for example, made it into the best-seller charts, while its VisiWord failed to make much of an impact. Overall, it seems that family associations are a useful selling point for a competitive product, but are not in themselves sufficient to guarantee success.

B. Integrated Management Packages: This trend towards integration has been taken a step further with what we shall describe as integrated management packages. These provide in a single integrated package all of the micro functions likely to be used by the typical corporate manager for his everyday requirements.

The pace has been set by two products: 1-2-3 from Lotus Development Corporation and MBA from Context Management Systems, both recent start-ups. Both packages combine spreadsheet, business graphics, DBMS and

word processing, while the MBA also uses a multi-window format and includes communications management, form generation and standard financial calculations. The 1-2-3, while lacking these features, offers a Help menu with over 200 sets of instructions and both offer tutorial programs for users to each use of the system.

In both packages, word processing capabilities are medium-level rather than high-powered, on the assumption that managers are unlikely to engage in heavy-duty text-processing. (This is largely accurate -- in most business environments, heavy-duty typing goes to secretaries, typing pools or WP centers, office automation or not.) Typical WP applications would be drafting and preparation of shorter documents such as non-standard letters, memos, short reports or messages.

Both are large programs operating on the IBM PC (Context claims that the MBA is the largest micro program ever written), and the Compaq portable (both), HP-9816 (MBA) and TI Professional Computer and Victor 9000 (1-2-3) are also supported. On the IBM PC, both require 256K RAM, a color/graphics card and two disc drives. In addition, the 1-2-3 features the largest spreadsheet on the market (256 columns x 2,048 rows). Fairly impressive for $495 (1-2-3) and $695 (MBA).

Success for these packages has been immediate, and both rapidly made it into the best-seller lists, with MBA receiving a substantial endorsement when United Technologies purchased more than 1,000 IBM PCs (from ComputerLand) and standardized on MBA for a program intended to introduce middle management to micro use.

Of the two, 1-2-3 places greater emphasis on ease of use and ease of training (Its advertisements proclaim that: "It's a fact! Ninety percent of business executives in this country suffer anxiety, insecurity and sweaty palms at the mere thought of using a personal computer!") while Context has adopted a more "hi-tech" approach stressing the sophistication of the system. There is clearly a place for both in the market.

Small Business Software

If general business software overlaps a variety of users, small business packages are sold largely to small companies, professionals and the like. They supply processing for functions which in larger organizations would normally be undertaken by mainframes, mini-based systems or (at the lower-end of the spectrum) conventional small business computers. In the vast majority of cases, users of micros for these applications will be start-ups or converting from manual procedures (at most, they will have been using a calculator).

<u>Conventional Applications Packages</u>: These can be divided into two main groups -- accounting packages and those using DBMS formats (principally mailing list, payroll and sales and inventory management).

A. <u>Accounting</u>: Basic accounting packages have developed for small business applications alongside the penetration of micros into the small business sector (for practical purposes, firms up to 20 employees). Developers have basically copied manual or calculator-based approaches, and prescribed accounting procedures have left little room for innovation. Also, firms converting from manual approaches tend to feel more comfortable if the old procedures are retained.

Accounting packages are built around one or more of three basic formats -- Accounts Payable (A/P), Accounts Receivable (A/R) and General Ledger, and a number of specialized procedures such as client accounting, time accounting, tax accounting and asset management.

This market area has tended to be more fragmented than other parts of the business market, with a wide range of vendors and products -- in May 1983, for example, there were upwards of 40 Accounts Payable, 50 Accounts Receivable and 50 General Ledger packages available for micros. Adding in packages for specialized applications (but excluding vertical packages), the total ran to more than 250. Market leaders are Peachtree, BPI and Continental Software, the first two having specialized in this area early on. The only accounting product from this "first generation" of discrete accounting packages that has remained in the best-seller lists is BPI's General Ledger, well on its way to becoming the VisiCalc of the accounting world. Like VisiCalc, it owes much of its continued success to recommendations and endorsements by word of mouth.

Most products are priced either in the $150-$300 or $500-$600 range for Accounts Payable and Accounts Receivable, while General Ledger packages are mostly in the $500-$750 bracket, although there is a wide spread in pricing and package sophistication in all categories.

B. Mailing List: The second largest category of small business software, mailing list packages, revolves around two functions: the maintenance and updating of mailing list data bases, and label printing, although there is a substantial variation among packages as to the size and complexity of the DBMS component. Simpler packages will offer only a limited

number of fields (typically enough for an address), while more sophis-
ticated models will allow the user to maintain larger sets of data for
each customer or prospect. Mailing list packages are typically inexpen-
sive, mostly in the $50-$100 bracket but with a few products above and
below this range.

C. Payroll: The requirements of federal, state and local taxation and
the various calculations that determine gross income (e.g., overtime,
bonuses) make the payroll function of even very small firms a candidate
for computerization, although fewer small businesses have automated this
function than have turned to micros for accounting and mailing list
maintenance. Similar to accounting, formats are fairly standard and
although a number of products are available with assorted enhancements
(e.g., employee histories, summary statements, calculations based on
seniority, skills and the like), there is little variation between
products. As for accounting packages, most packages are in the $150-$250
or $500-$600 ranges.

D. Order Processing/Inventory Management: Like the other categories of
small business software, these packages mostly involve replicating
manual procedures on software, although the more sophisticated ones also
do sales analysis, order form preparation and similar features generated
from the data base. This is a small area, with most of the growth now
occurring in vertical packages. There are several dozen general packages
available spread over the $100-$1,000 bracket, depending on program size
and complexity.

Integrated Packages: As in general business packages, the clear trend
in small business application packages is towards integration, and most
of the vendors offer sets of compatible modules for individual applica-
tions which can operate in standalone mode or as part of integrated
systems. The integration process mainly involves the accounting, pay-
roll and order processing/inventory management functions. Software
Dimensions' Accounting Plus series, for example, offers an eight module
system for CP/M environments including General Ledger, Accounts Payable,
Accounts Receivable, Payroll, Inventory Control, Sales Order Entry,
Purchase Order Entry and Point of Sale Accounting options. Operating as
an integrated package, it requires data to be entered only once for the
entire package and provides a variety of report generation formats both
for individual modules and for the system as a whole.

Other leading products include Peachtree's Peachtree Accounting
(eight modules for CP/M and the IBM PC), Great Plains Software's
Hardisk Accounting Series (eight modules for Apple II/III and IBM PC)
and Open Systems' Software Fitness Program (seven modules for CP/M,
IBM PC and UNIX/Xenix environments). Modules are typically priced at
$400-$600 each, with an eight module system averaging in the $3,000-
$5,000 bracket.

Similarly, dedicated mailing list programs are increasingly giving
way to packages integrating standard WP and mailing list functions, and
the market is effectively moving towards a situation in which there will
be two groups of packages -- integrated accounting systems and combined
WP, mailing list and related function packages.

To date, no small business equivalent of the Lotus 1-2-3 or Context MBA has appeared, although the LISA system is clearly the way the market will go. However, as is discussed later in this section, the success of LISA itself and the rate at which small businesses are likely to give up traditional package styles are by no means clear.

Vertical Markets

Tailored to the particular requirements of specific types of business, vertical packages represent one of the largest potential growth areas for micro business software. As Exhibit 3-5 shows, there are more than thirty major small business sectors for which vertical packages have started to appear, and many of the larger categories (e.g., agriculture, business services, and wholesale/retail) are in turn made up of numerous subsegments, all of which have begun to generate distinctive products. In the retail area, for example, packages are available for such specialized groups as antique dealers, art galleries, florists, tire dealers, fuel oil distributors and liquor stores, while the business services sector has seen a wide range of applications packages for firms such as employment agencies, credit reporting agencies, laboratories, and consultants. A full listing of potential categories would run (at a conservative estimate) to over 200 items, of varying degrees of attractiveness as candidates for micro packages.

Vertical Market Segments: The attractiveness of different segments of the small business vertical markets has proved to be a function of several different factors, notably whether the firm's work involves much in the way of statistical data (e.g., accountants, engineering and

Exhibit 3-5

Vertical Market Segments

Type and Number of Organizations	Units Shipped by YE 1982	Units Shipped 1983	1983 Market ($ Millions)
Accounting/Bookkeeping Firms 85,000	2,000	1,600	3.2
Advertising/Public Relations 40,000	*	*	*
Agriculture 2.4 Million	3,000	5,500	4.0
Architecture/Civil Engineering 75,000	500	1,200	1.8
Automotive Services 230,000	*		
Banks 14,000	200	200	0.3
Brokerage Houses 35,000	1,400	2,200	3.4
Business Services 125,000	*	100	0.1
Churches, Other Religious 320,000	*	1,000	0.2
Construction/Contractors 400,000	2,400	10,000	19.0
Credit Unions/Savings & Loans 20,000	200	300	0.8
Dental Offices 110,000	1,000	3,000	7.1
Hospitals/Nursing Homes 22,000	*	200	0.3
Hotels/Motels 40,000	150	600	2.8

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Exhibit 3-5 (Cont.)

Vertical Market Segments

Type and Number of Organizations	Units Shipped by YE 1983	Units Shipped 1983	1983 Market ($ Millions)
Insurance Agencies 60,000	100	200	0.5
Labor Unions 20,000	*	100	0.1
Law Enforcement 30,000	*	100	0.4
Legal Services 75,000	600	2,000	2.4
Library Services 25,000	150	400	0.6
Maintenance and Repair 200,000	*	*	*
Medical and Dental Labs 15,000	*	200	0.4
Medical Offices 150,000	2,000	5,000	12.5
Personal Services 500,000	*	100	0.1
Pharmacies 100,000	500	1,000	5.0
Printing/Publishing 30,000	300	500	2.0
Real Estate/Propery Mgt. 130,000	500	4,000	5.6
Recreation Services, Clubs 50,000	*	100	0.0
Rental and Leasing Services 35,000	*	100	0.1

Exhibit 3-5 (Cont.)

Vertical Market Segments

Type and Number of Organizations	Units Shipped by YE 1982	Units Shipped 1983	1983 Market ($ Millions)
Retail (excl. Pharmacies) 1.6 Million	400	3,000	4.5
Generic Packages	200	1,700	
Restaurants, Bars 300,000	125	800	
Gas Stations 150,000	75	300	
Liquor Stores 45,000	*	100	
Mail Order 10,000	*	100	
Transportation 100,000	*	100	0.2
Travel Agencies 20,000	*	200	0.4
Utilities 10,000	*	100	1.2
Veterinary Offices 20,000	100	200	0.5
Wholesale/Distributors 220,000	500	2,200	6.2
Generic Packages	500	1,000	
Specialized Applications	*	1,200	
Total	16,000	46,000	$86.0

construction contractors, brokerage houses), the typical degree of education of small business principals (professional groups in the above areas and in such fields as medicine, law and dentistry tend to be more open to micro use) and the financial resources of the typical firm in a given sector (in areas such as retail, personal services and business services, for example, there are large numbers of small "mom and pop" outfits).

To date, most of the action in vertical software packages has been in a dozen sectors, principally accounting and bookkeeping services, agriculture, architects and civil engineers, brokerage houses, engineering and construction contractors, legal services, real estate, pharmacies and medical, dental and veterinary firms. All of these possess distinctive requirements for data collection, filing and processing which are only in part fulfilled by such standard applications as accounting, payroll and mailing list management.

Pharmacies provide a useful example of why a small business would need specialized applications software. Unlike most types of retail operation, the nature of the pharmacy's product line (i.e., drugs) requires careful accounting of contents and of who gets what, and the risks of making mistakes are such that paperwork is more laborious and thorough than would be the case for most retail products, and highly specialized items are not typically stocked and have to be ordered in advance. The same principle applies to all organizations in the health care field (including the care of animals -- veterinary organizations have proved to be a leading sector in micro use).

These sectors can all be considered to have a requirement for computer usage somewhat above the norm, and all have to date been major markets for vertical systems based on conventional small business computers (SBCs). Similarly, areas such as banking, credit unions, health care facilities and utilities have thus far proved to be small markets for vertical micro packages not because they do not have such a requirement but because a high proportion of the larger and more advanced users already have an SBC-based system or access to a specialized timesharing service. The micro is very much a "Johnny-come-lately" to this type of user, and in only a few cases have vendors of micro-based vertical packages succeeded in competing successfully with SBCs and timesharing companies. Even where there is a marked cost advantage to a micro-based system, customers have tended to prefer the "tried and proven" and the support and aid in installation and training that a few micro package vendors can offer.

Types of Vertical Packages: Vertical market software is an extension more of the applications packages designed for small businesses than of general business applications, and mirrors the main categories of the former described earlier -- accounting, sales management/inventory control and mailing list/customer data base applications. The vast majority of vertical micro packages currently on the market are fairly minor modifications of these standard formats with appropriate terminology inserted for the particular type of business (e.g., inventory control data bases with pre-written categories for typical products, billing packages for medical applications which include items such as insurance

coverage and numbers). In most cases, these involve simple software adaptations of manual procedures and formats.

Despite the early stage of development of micro vertical markets, the same trend towards integration that has been noted in the other business areas is apparent, and a number of packages have begun to appear that offer a complete integrated data management system for given types of business. Two examples can be used to illustrate this:

1) Charles Mann & Associates' Medical Office Management System, at $950 for the Apple II. The system manages appointments, private patient billing, third party claim form preparation, diagnostic treatment records, patient report generation, mailing lists, referral letters and general word processing, and includes a variety of options for merging data from various data bases for report generation.

2) Farmplan Computer Systems' Crop Management Program, at $950 for the Apple II. The system provides a variety of functions for farmers, including consolidated accounting and resource management and planning, and similar capabilities on a crop-by-crop, field-by-field basis. Records are handled for up to 150 fields, 200 types of resource (e.g., manpower, equipment, seed, irrigation) and 50 user-designed applications programs, and features include crop budgets, cash-flows and profit projections, inventory and manpower management and conventional account-ing applications. In these cases, and with comparable integrated pack-ages for other sectors, the object of the exercise is to provide a com-plete solution for small business paperwork and planning, to the extent that the system becomes an indispensable part of doing business in a given area.

Pricing varies according to market segment, with the least expensive packages in the $100-$200 bracket and the more comprehensive and complex running at upwards of $4,000. The majority, however, are in the $250-$1,000 range (Exhibit 3-6 shows typical pricing levels on page 93). As in more generalized types of small business accounting software, vendors also frequently offer sets of modules capable of operating in standalone mode or as part of a larger integrated package, and pricing tends to reflect the levels of the generalized systems.

Distribution Economics: Although they represent large numbers of potential users, most vertical market segments pose problems in terms of distribution economics -- they consist of a geographically dispersed customer base whose individual purchases are not likely to be much over $1,000 and will often be less than that. Moreover, even at their peak later this decade, the largest segments are unlikely to account for more than 20,000-50,000 package sales per annum (two areas, agriculture and retail, with 2.4 and 1.6 million potential users respectively might yield larger markets, but even here subsegmentation is likely to have the same effect). Most segments are likely to account for fewer than this.

Distribution for vertical markets has to date fallen between two major groups of distribution channels:

1) Computer and software retailers -- while this group accounts for most sales of general business packages and standard small business applications such as accounting, payroll and mailing list management, there will not typically be enough of a given type of vertical package

customer in any location to make it worthwhile for retailers to stock

such specialized items -- only a handful of vertical packages have

appeared via retail outlets, and even then not on a large scale.

2) Conventional distribution channels for small business computers

(SBCs). These include electrical and electronic equipment distributors

and OEM systems houses -- many of the latter use vendor supplied SBCs

as the basis of bundled hardware/software systems for vertical markets,

and SBC vendors such as IBM (System/23, Series/1 and System/30 series),

Wang (2200 Series), Basic Four (System 80) and Burroughs (B80/90) offer

their own lines of vertical software. For both groups, however, the

economics of supplying micro-based vertical systems are considerably

less attractive than for SBCs, with the overhead for product development,

sales and support similar and the system price less: $5,000-$8,000

against $10,000+ for most SBCs.

The result has been that vertical market vendors have typically

had to market "on the cheap" using periodical advertising, limited

direct mail and referrals for new business and mail order for delivery.

Inevitably, the degree of support that can be realistically offered is

limited. This whole sector has come to be characterized by a "vicious

cycle" with unattractive distribution economics breeding limited market-

ing, little or no support and all too often poor quality products.

Moreover, the vast majority of vertical micro package suppliers have

been "garage shops," without the resources for proper product development,

sustained marketing campaigns and adequate support -- for the average

"garage shop" breakeven has to be pitched low. Two of the side-effects

of this, the notoriously bug-ridden nature of vertical packages and the

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tendency of vertical suppliers to disappear overnight, have not helped the credibility of specialized software for these markets and have created considerable suspicion among many potential users.

The enthusiasm of "garage shops" has not to date been shared by the major micro vendors (although firms specializing in more high-powered and expensive micros such Altos, Corvus, Cromemco and Televideo have been more successful in following the same third-party routes as SBC vendors) or the major business software houses, who would be better-placed to handle the overheads involved and spread them over longer production runs. Vendors with SBC lines such as IBM, DEC, Basic Four and Burroughs have been deliberately pulling punches to protect the latter.

Vendors: To date, the vertical package sector has proved to be the least concentrated of all micro software markets. Except in very small segments where there is not much competition, no vendors have emerged as dominant even in single types of packages, and given that most vendors work only with limited, often local sets of prospects, it is difficult to talk of competition in much of the market. The vendor's primary problems are selling customers on the idea of using vertical software, and their own credibility, not competitors. In this respect, the vertical package sector resembles the micro software market in general in its earliest days. Moreover, there are very few large firms in this market -- Tandy markets a few vertical packages, but otherwise the firms who are leading players in the general business and standard small business package markets are noticeable by their absence.

Further, only a handful of firms have successfully marketed packages to more than one segment -- the majority are composed of programmers and/or industry specialists with backgrounds only in one particular field. Among the more notable vertical vendors are:

A. <u>International Micro Systems (IMS)</u>: Established in 1977, IMS has diversified from standard small business applications and manufacturing software into a number of vertical market segments, including church management ($3,000), dental offices ($2,000), and medical practices ($2,000) for CP/M systems. The company cleared $1 million in revenues in 1982.

B. <u>Charles Mann & Associates</u>: With 1982 revenues of over $5 million, Charles Mann & Associates markets a variety of standard small business applications packages in addition to vertical lines for contractors (a construction accounting package at $800 and a job costing program for contractors at $450), legal offices ($400), dental offices ($500) and medical practices ($450 and $1,000), all for the Apple I and III.

C. <u>Micro Data</u>: Founded in 1978 and with 1982 revenues of over $500,000, Micro Data markets a dozen products for standard small business applications and vertical packages for contractors (a job costing system for $300 and billing, accounts payable and payroll packages at $500), restaurants (a payroll system at $500), a general retail inventory package at $500 and packages for insurance agencies ($600), golf pro shops ($500), utilities ($600) and private clubs (a membership records and billing package at $500). All are CP/M-compatible.

D.   Occupational Computing Company: With revenues of over $1 million
in 1982, OCC specializes in vertical packages.   The company markets
packages for CP/M and the TRS-80 for contractors (a five module system
covering accounts payable, accounts receivable, payroll, job costing
and specialized construction accounting at $1,000 each), restaurants
(sophisticated package at $4,500 covering payroll and items such as
advances, meals for employees and tips that was originally developed in
cooperation with a MacDonalds' franchise group), labor unions ($500)
and accountants ($500).   The company's policy is to work closely with
particular customers in developing packages and, unusually for a small
firm, offers an 800 number "hot line" for handling customer queries and
software problems.

E.   Tandy: Tandy markets TRS-80 packages for several major segments,
notably medical offices (a $750 billing system), legal offices ($300),
contractors (a $150 job costing package) and stock and fund managers
($1,000).   In addition, the company markets packages providing on-line
access to specialized third-party data bases for lawyers (the Westlaw
data base at $150) and farmers (the AgriData Network at $200).

F.   Univair Incorporated: Founded in 1972 and with 1982 revenues of
over $3 million, Univair markets more than 30 vertical packages covering
medical practices, dental offices, pharmacies, insurance agencies,
lawyers, real estate managers and accountants.   It also still markets
its original product line, a family of packages targeted at small air-
line companies and general and standard small business applications
packages.   Its packages are CP/M-compatible and typically priced in
the $500-$1,000 range.

Leading vendors in individual vertical market segments are shown in Exhibit 3-6.

Criteria for Success: The problems posed for suppliers of vertical software by distribution economics have already been described, and there is no easy solution to them -- the successful firms in this sector have tended to be those with other business product lines and/or other micro-related activities (e.g., hardware distributors, consultants) and their vertical package sales have been built up slowly and laboriously. Vertical packages have to date not been a "get rich quick" business. While in other sectors small firms have been able to prosper by having their products distributed by larger organizations such as micro vendors, major retail chains and/or software distributors, in the vertical market area they have mostly had to do it themselves. Two factors have been particularly important:

1) Product Development. Despite the profusion of vendors, there is very little good micro software available for vertical market segments. While much of this is perhaps inevitable with "garage shops," it is also rare to find products developed by individuals with both the required programming skills and in-depth knowledge of the end-user's requirements. (Many small companies have, for example, developed reasonably good first products based on the experience of their principal or principals, and then turned out poor quality material when they turned their hands to areas they knew less well.) The more successful vertical package vendors have typically adopted one of two approaches: i) close coopera-tion with individual customers representative of the segment as a whole in package development and/or ii) working with outside consultants with

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Exhibit 3-6

Pricing and Vendors in Vertical Market Segments

Type of Organization	Typical Pricing	Principal Vendors
Accounting/Bookkeeping	$1,000-$4,000	R&B Computer Systems Micronetics Accountants Microsystems
Advertising/Public Relations	N/A	Thoman Software Microbase Software
Agriculture	$250-$1,200	Harris Technical Systems United Softwarehouse Farm Plan Computer System
Architects/Civil Engineering	$1,000-$2,500	Micro Mode McClintock
Banks	$300-$600, $1,000	BISS Ampersand Victor
Brokerage Houses	$250-$3,000	Compu Trak Dow Jones Remote Computing Tandy
Churches	$250-$500, $3,000	IMS Custom Data BPI Vector Graphic
Construction/Contractors	$1,000-$2,500	Construction Data Control Contractors Management Systems Data Automation Services Tandy
Credit Unions/S&Ls	$1,500, $3,000	Relational Systems Intl. NISUS
Dental Offices	$1,500-$2,000, $8,000	IMS SYCOM Charles Mann
Hotels/Motels	$4,000-$8,000	Unique Information Systems New Systems

Exhibit 3-6 (Cont.)

Pricing and Vendors in Vertical Market Segments

Type of Organization	Typical Pricing	Leading Vendors
Insurance Agencies	$1,000+	Univair American Micro Dynamics
Labor Unions	$500, $2,500	Micro Business Systems Occupational Computing
Law Enforcement	N/A	Simcon/Durango Applied Electronics
Legal Offices	$250-$1,000	Tandy Star Computer Systems Univair
Library Services	$500-$2,500	Computer Technology Inc.
Medical and Dental Labs	$3,000-$5,000	Compusol
Medical Offices	$750-$1,000, $2,500-$3,000	IMS Dagar Enterprises Tandy Charles Mann Software Products Intl.
Oil/Gas Producers, Operators	$5,000+	CAI Computers High Technology Software
Pharmacies	$9,000+	Dagar Enterprises Diversified Data Systems
Printing and Publishing	$3,000-$5,000	Printers Software Inc.
Real Estate/Property	$100-$250, $1,000-$1,500	Star Computer Systems Tandy Solid Software
Recreational Services, Clubs	$300-$500	Micro Data Southern Digital Systems
Rental and Leasing Services	$500, $2,000	Southern Digital Systems Micron

Exhibit 3-6 (Cont.)

Pricing and Vendors in Vertical Market Segments

Type of Organization	Typical Pricing	Leading Vendors
Retail		
Gas Stations	$500-$600	AEM Computer Services Institute of Scientific Analysis
Restaurants, Bars	$500, $2,500	Occupational Computing Micro Data
Liquor Stores	$3,000	AEM Computer Services
Mail Order	$500	Southern Digital Systems
Transportation		
Trucking	$12,000	TCM
Airlines/Air Charter	$500-$2,000	Univair Mini Business Systems
Travel Agencies	$4,000	LaSalle Computing
Utilities	$600-$1,000	E.F. Haskell Micro Data
Veterinary Offices	$2,000, $8,000	And All STR Corporation
Wholesale/Distributors		
Beer Distributors	N/A	Carlson Computer
Oil and Gas Distributors	N/A	Johnson Associates Carlson Computer
Lumber Dealers	$3,000	Johnson Associates

experience in the targeted market segment, usually as part of a develop-
ment team with skilled programming staff. International Micro Systems,
for example, one of the more successful vertical specialists, works with
panels of industry and program development experts. Whichever approach
is adopted, there is no substitute for rigorous beta-testing and the
more serious vendors will typically run through several iterations
before arriving at a satisfactory product.

2) Credibility. The poor track records of many vertical specialists
and the existence of more than a few "fly-by-night" outfits has created
considerable user suspicion (not that the average small businessman was
an easy sales prospect in the first place). It is generally recognized
that vertical package customers are a "hard sell," and that good-quality
documentation, a credible commitment to support (at a minimum, by
telephone) and some initial familiarization are crucial. It also helps
to be able to provide endorsements from users and/or details of how the
product was developed. For the start-up firm, this is not easy, and
even the larger firms have experienced a "vicious cycle," with none of
them being able to generate the coverage and credibility that could open
up their markets on any scale. As one principal of a small vertical
specialist firm commented: "If IBM, DEC or one of the other big firms
came out with a product tomorrow, it would open this market right up."
In the meantime, vertical package vendors have to establish credibility
the same way they have had to build up distribution -- the hard way.

Trends in the Business Market

The micro was first established as a serious business tool by the
introduction of VisiCalc on the Apple II in 1979, and electronic

spreadsheets continue to represent the largest single category of micro business package sales. It is worth recalling, however, that only four years have elapsed since this time, and it would be unwise to assume that the present lines of the micro software market are going to remain indefinitely.

VisiCalc and its imitators are representative of the whole character of business use of micros to date -- they allow the individual to approach a particular problem by using the computer to experiment with different formats and arrangements of figures, and then to use the machine's processing power to perform the necessary "number-crunching." At the risk of repeating the obvious, the use of micros for business applications has to date had a strongly "personal" focus -- essentially the same use has been made of micro hardware/software for business regardless of whether the user has been a small business principal, an employee of a larger organization or a professional (e.g., an accountant or other financial specialist). The user profile has also tended to be similar -- younger, more educated and/or coming from a technical background, and choosing micro packages from those available through computer and software retailers according to his or her needs and assessment of the quality of the product.

Over the last two years, however, there have been signs that this pattern is starting to breakdown, and that the homogeneity of the market is starting to give way to a more differentiated set of segments, principally:

1) The large organization market. The key developments here have been the emergence of integrated management packages, the shift towards

centralized purchasing and implementation and the aggressive marketing activities of the larger systems vendors to their large accounts. The result has been that not only are specialized types of packages emerging for this market, but that distribution is moving away from the retail channels that have hitherto served this market and towards one-on-one relationships between corporate functions and large-volume sellers. Moreover, the integration of micros into mainframe-based communications scenarios is clearly going to cause the market to follow that for more conventional types of data processing hardware -- managers and departments typically exercise little control over what type of terminal they can use, and by the second half of the decade this is going to be the case for micros also.

2) The small business market. The key trends here are the emergence of extremely user-friendly systems such as LISA and the increasing resemblance between the micro small business market and that for SBCs. These are to some extent contradictory, and represent different approaches to the same problem -- that of providing "hand-holding" and minimizing the traumas of computerization for small businesses whose principals are not technically competent. Whereas the LISA approach attempts to solve the "hand-holding" problem by doing away with it, the "SBC" approach involves translating to micros the traditional practice of the SBC vendors and dealers of making the software as much like manual procedures as possible. Thus while the LISA approach involves using the same mainstream distribution channels as for "personal business" micros, the "SBC" approach involves putting micros into OEM channels that will typically deal directly with small businesses and provide on-site support and "hand-holding."

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Management Micro Packages: The Lotus 1-2-3 and Context MBA described
earlier are clearly the first of a large number of these integrated
management packages, and the stated intentions of Context Management
Systems to implement the MBA into VisiON are also significant -- the
probability is that over the next few years LISA-type systems will
become common for the large organization management market.   Whatever
the individual features of these packages, however, their key attraction
is that, as integrated packages, they only have to be learned once.
When dealing with managers who are not technically competent and who
seldom welcome the use of micros, the ability to "train-and-forget" is
important.

In the longer-term, it is probable that current patterns of micro
usage in large organizations, with managers maintaining a high degree of
autonomy over how they use their systems, will turn out to be a passing
phase.   By 1985-1986, most of the larger systems vendors will have
succeeded in straightening out their product lines and differentiating
their mass-market micro lines from those offered to large accounts, with
the latter increasingly becoming intelligent terminals tied into overall
corporate communications systems.   While a market for discrete package
sales for users of these systems will remain, by the end of the decade
it will be a minor component of the overall large organization market,
which will involve mostly standard integrated packages supplied by
systems vendors, either developed in-house or supplied by third-parties.

Small Business Micro Hardware/Software: One of the more striking
aspects regarding the fast and substantial development of the computer
industry in the 1970s has been the way in which similar patterns have

occurred with progressively smaller systems. Small business computers, for example, began to develop in the early 1970s and over the decade became increasingly powerful and moved away from standard small business applications towards vertically-oriented applications for particular types of business, generating in the process a large sector of specialist firms which marketed SBCs to small firms and/or developed vertical software for them (generally referred to as "systems integrators"). The beginnings of the same process are apparent in the micro sector, although progress has to date been slow for the simple reason that there is not a great deal of margin on a micro when compared with larger and more expensive SBC systems, which can run anywhere from $10,000 to $100,000. However, the emergence of increasingly powerful and sophisticated micro systems is drastically shifting price/performance ratios in favor of the latter and away from conventional SBCs. While one can only admire the technological forces involved, it is also clear that from a business point of view, this is not particularly desirable for those with a stake in the SBC market. Were they to move whole-heartedly to marketing micros, they would be faced with a similar level of marketing, product development and support overhead to be offset against a much reduced margin per sale. There are three potential ways out of this impasse for these companies:

A. The LISA Approach -- Painless Computing: The LISA approach intro-duced by Apple has already been discussed at several points in this study, and it is clearly a very impressive system. However, it represents an attempt to convert the unsophisticated small business principal to

the mainstream micro market, not vice versa, and its applications
packages reflect general rather than small business types of packages.
(Where, for example, is LISAAccounts Receivable or LISAInventory?)
However well the system performs in practice, converting from manual
accounting procedures to the use of a "mouse" is unlikely to be achieved
without a certain amount of confusion. In the long-term as discussed
in Section 2, this is clearly the way that the market will go, but the
process is likely to involve a slower pace of integration. In the
meantime, LISA and its inevitable imitators are likely to sell to
exactly the same market as Apple has always sold to -- the technically
competent user.

B. Volume: The generation of large volumes for manufacturing economies
is, of course, the traditional solution to marketing low-margin products.
To date, as discussed earlier in this section, distribution economics
have proved to be a major bar to micros going the way of SBCs and to
developing a large sector of systems integrators and vertical software
specialists. This impasse was rudely broken in February 1983, when
IBM put its PC out into its Value-Added (i.e., OEM) program, with the
result being firms scrambling for the opportunity to become systems
integrators for a $3,000 micro (something that would have been unimagin-
able a few years ago). Moreover, other large computer vendors such as
DEC, Data General, Basic Four and Burroughs that have been major forces
in the SBC market are increasingly "cutting their losses" and giving up
protecting their low-end SBC lines.

One of the key problems for vendors in vertical market segments has been credibility, and this is a commodity that companies such as IBM and DEC do not appear to lack. Moreover, as these vendors reorient their product strategies to give their micro lines a "free run" at the low-end of the business computer market, the probability is that they will follow the practice they did for SBC lines -- introducing their own vertical package lines and/or endorsing those of third-parties. (In this context, it is worth recalling that IBM introduced a series of vertical market packages for its unsuccessful 5100 series small business system, which was effectively replaced by the IBM PC.) The effect of this on the market would clearly be to open it up to a much greater extent.

C. Upward Compatibility: In discussing the future of business micros, it is noticeable that one of the potentially most significant trends in this area has been largely neglected -- that the erosion of the conventional SBC market by micro-based systems is creating the possibility of a software-compatible systems upgrade path from $3,000 machines well into the bracket for SBCs.

The upgrade path has always been a major preoccupation for SBC vendors, the aim being to "lock in" a small business at an early stage of its growth to a particular vendor's systems, and then upgrade it to progressively larger and more expensive machines. Over the last five years most of the SBC vendors have attempted to move the start-point of this path downward into firms of less than 20 employees, although they have not been particularly successful (N.B. the IBM 5100 series; the original Wang Personal Computer, intended as an entry into the 2200 series). The large-scale emergence of microprocessor-based systems

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destroyed the already slim chances of success for this approach, and has instead raised the possibility of expanding micro lines upwards and providing upgrade paths to larger and more expensive machines that way. Under these circumstances, tolerating low-margins on entry-level micros makes much more business sense. (We suspect that IBM's recent liking for volume in its PC marketing strategy is related to this issue.)

The result will be that the business market for micro software, particularly for standard small business and vertical applications, will progressively extend to larger systems in the price bracket hitherto occupied by SBCs. Those currently involved in developing and marketing micro software should not, however, celebrate too soon -- this trend will also bring into the market large numbers of systems integrators with much greater resources than the average vertical package developer currently has in this market.

Market Outlook

From $863 million in 1983, we anticipate that the annual business package market will grow to more than $8.1 billion in 1988 and remain at $8.1 billion in 1993, with unit shipments increasing over the same period from 2+ million to 15+ million to over 23 million by 1993, by which time we anticipate that this market will be in its third product generation and heavy replacement and/or conversion activity will be starting to occur (see Exhibits 3-7 through 3-11).

In projecting this market on a ten-year basis, the following assumptions were made:

General Business: This market will be characterized by two trends:

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Exhibit 3-7

1983 U.S. Market for Business Packages

	Units	Avg. Price	$ Millions	% Market
General Business				
Spreadsheets	762,000	$285	217	25.1
Word Processing	635,000	$325	206	23.9
Personal DBMS	515,000	$275	142	16.4
Business Graphics	70,000	$165	12	1.4
Scheduling/Planning	12,000	$300	4	0.5
Integrated	55,000	$580	32	3.7
	2,049,000		613	71.0
Small Business				
Accounting	226,000	$500	113	13.1
Payroll	65,000	$250	16	1.8
Order Processing/ Inventory Mgt./Sales	45,000	$500	23	2.7
Mailing List	155,000	$75	12	1.4
	491,000		164	19.0
Vertical				
Contractors	10,000	$1,900	19	2.2
Medical Offices	5,000	$2,500	12	1.4
Wholesale/Distributors	2,200	$2,800	6	0.7
Dental Offices	3,000	$2,400	7	0.8
Pharmacies	1,000	$5,000	5	0.6
	25,800	-	37	4.3
Other	46,000		86	10.0
Total	2,586,000		$863	100.0%

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1)   The differentiation of large organization and small business and individual user markets for general business applications packages, with the former consisting increasingly of centralized bulk lot purchases from major systems vendors or large dealer/distributor groups, and the latter continuing to be served by the mainstream retail sector.

2)   A large-scale shift towards integrated management packages in the large organization and (to a lesser extent) other markets. The increasing preponderance of large organization sales in this sector over the forecast period for $3,000+ micros and software will accelerate this trend, with this group being typically heavier users of integrated packages than other groups. The effects in terms of the overall market will, however, be limited by the growth of portable usage over the 1983-1988 timeframe. Users of these systems are more likely to purchase discrete applications packages initially, although by the end of the first half of the forecast period it is likely that the trend towards integrated packages will have caught up in this field also.

Among conventional types of application packages, we anticipate that spreadsheets and business graphics packages will be most affected by the shift towards integrated software, and word processing least. As most integrated packages will contain only low- or medium-power word processing capabilities, there will still be demand for higher-powered discrete packages by individual and small business users, and this type of package will also see growth as a result of the merging of standalone word processor and micro lines by most hardware vendors post-1985.

Pricing of most packages in this sector is assumed to be stable for the next three years, but with subsequent pricing declines in spreadsheets and business graphics as a result of competition from integrated packages. Average value of word processing and scheduling/planning packages will increase over the same timeframe as integrated packages erode the market for less sophisticated products and market composition shifts in favor of higher-priced items. Forecasts are shown in Exhibit 3-8.

Small Business (Standard Applications): This sector is likely to see integration of a different type, with the emphasis on sets of compatible modules capable of operating as part of an integrated accounting system, and with mailing list packages being increasingly integrated into word processing software either as a single product or as an add-on feature. Forecasts through 1993 are shown in Exhibit 3-9.

Growth patterns are likely to be affected by two factors:

1) A slow-down in the rate of micro penetration into the small business sector of the U.S. economy during the second half of the forecast period as this market stabilizes.

2) Competition from vertical packages, particularly those for the larger vertical market segments, which are likely to be increasingly available over the forecast period. There will undoubtedly remain a distinct market for non-vertical packages for such functions as accounting, payroll, order processing, inventory management and the like, but sales of vertical packages are likely to contribute further to a slowdown in this sector from 1987 onwards.

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Exhibit 3-8

1983-1993 Market Forecast: General Business

Units (Thousands)	1983	1984	1985	1986	1987	1988	1990	1993
Spreadsheets	762	1100	1320	1530	1600	1400		
Word Processing	635	950	1280	1610	1930	2250		
DBMS	515	770	1100	1420	1760	2100		
Bus. Graphics	70	115	180	225	250	260		
Sched./Planning	12	20	25	30	35	40		
Non-Integrated	1994	2955	3905	4815	5575	6050	5550	8500
Integrated	55	320	895	1935	3750	6150	9450	12500
Total	2049	3275	4800	6750	9325	12200	15000	21000

Average Pricing ($)	1983	1984	1985	1986	1987	1988	1990	1993
Spreadsheets	285	275	250	250	200	150		
Word Processing	325	325	325	365	375	350		
DBMS	275	275	250	250	250	250		
Bus. Graphics	165	165	165	155	145	145		
Sched./Planning	300	300	325	335	340	350		
Non-Integrated							250	200
Integrated	580	580	550	500	500	500	450	400

$ Millions	1983	1984	1985	1986	1987	1988	1990	1993
Spreadhsheets	217	303	329	382	320	210		
Word Processing	206	309	416	587	724	788		
DBMS	142	212	275	355	440	525		
Bus. Graphics	12	19	30	35	36	38		
Sched./Planning	4	6	8	10	12	14		
Nont-Integrated	581	849	1058	1379	1532	1575	1388	1700
Integrated	32	186	492	968	1875	3075	4252	5000
Total	613	1035	1550	2337	3407	4650	5640	6700

% Integrated	1983	1984	1985	1986	1987	1988	1990	1993
Units	2.7	9.8	18.6	28.7	40.2	50.4	63.0	59.5
$ Volume	5.2	18.0	31.8	41.4	55.0	66.1	75.4	74.6

Exhibit 3-9

1983-1993 Market Forecast: Small Business

Units (Thousands)	1983	1984	1985	1986	1987	1988	1990	1993
Accounting	226	350	525	725	905	970	925	750
Order Processing/ Inventory Mgt./Sales	45	90	155	230	325	340	325	240
Payroll	65	110	185	265	340	350	350	265
Mailing List	155	240	320	420	550	570	555	425
Total	491	790	1185	1640	2120	2230	2155	1680

Average Pricing	1983	1984	1985	1986	1987	1988	1990	1993
Accounting	500	500	500	550	575	525	500	400
Order Processing/ Inventory Mgt./Sales	500	500	500	550	575	525	500	400
Payroll	250	250	250	285	300	275	250	200
Mailing List	75	80	90	105	105	105	90	80

$ Millions	1983	1984	1985	1986	1987	1988	1990	1993
Accounting	113	175	265	400	520	510	465	300
Order Processing/ Inventory Mgt./Sales	23	45	75	125	185	180	165	95
Payroll	16	30	45	75	100	95	90	55
Mailing List	12	20	30	45	60	60	50	35
Total	164	270	415	645	865	845	770	485

<u>Pricing and unit shipment projections</u> refer to module or function levels rather than necessarily to discrete products. The current trend towards sets of modules capable of acting as parts of an integrated accounting system will mean that by the 1985-1986 timeframe virtually all sales in this sector will be of integrated system modules, but it is unlikely that this will give way to single-package integrated systems such as are emerging in the general business sector. The convenience for small businesses of being able to spread software purchases over time, and the fact that not all small businesses are going to require all of the functions offered will act against developments in this sector comparable to packages such as the Lotus 1-2-3 and Context MBA.

<u>Pricing</u> is expected to remain stable for the next three years; in the post-1985 timeframe, however, we anticipate declines in average pricing of software products for high-end micro systems, but this trend will be outweighed by an increase in average value as a result of the penetration of micro-based systems into the conventional small business system market until the last part of the forecast period.

<u>Vertical Business:</u> We anticipate that the vertical business sector (see ten-year market forecasts in Exhibit 3-10) will be characterized by two trends:

1) An increase in vertical package shipments, particularly to major segments, will occur, as a result of growing attention to vertical markets by micro vendors and increasing use by the latter of OEM/systems house channels to handle distribution of current lines of high-end micro, occurring over the 1983-1988 timeframe. In the post-1986 period, however,

Exhibit 3-10

1983-1993 Market Forecast: Vertical Business

	1983	1984	1985	1986	1987	1988	1990	1993
Installations (000)	46	110	275	510	860	1025	965	535
Average Value ($ 000)	1.87	1.90	2.55	2.65	2.55	2.55	1.95	1.70
$ Volume (Millions)	86	210	700	1350	2200	2600	1900	900

Exhibit 3-11

1983-1993 Market Forecast: All Business Types

Units (Thousands)	1983	1984	1985	1986	1987	1988	1990	1993
General Business	2049	3275	4800	6750	9325	12200	15000*	21000*
Small Business	491	790	1185	1640	2120	2230	2155	1680
Vertical (Installations)	46	110	275	510	860	1025	965	535
Total	2586	4175	6260	8900	12305	15455	18120	23215

* Primarily replacement market.

$ Millions	1983	1984	1985	1986	1987	1988	1990	1993
General Business	613	1035	1550	2337	3407	4650	5640	6700
Small Business	164	270	415	645	865	845	770	485
Vertical Business	86	210	700	1350	2200	2600	1900	900
Total	863	1515	2665	4332	6472	8095	8310	8085

there will start to be declines in average unit pricing as a result of greater volume and competition.

2) The appearance of more powerful 32 bit micro-based systems from 1984, and gathering momentum in the 1985-1987 timeframe will result in increased activity by systems houses offering bundled and turnkey systems using micros rather than conventional small business computers as base units. This will result in a higher overall dollar volume as more expensive micro-based installations are made. In this context, it is noticeable that where micro-based systems have competed successfully with small business computer-based approaches in present vertical market segments, average software value per installation has tended to be higher than the norm, running typically in the $3,000-$6,000 bracket. The result will be to offset pricing declines in discrete vertical packages post-1986. Both categories will, however, be affected by the slow-down in small business micro usage growth during the second half of the forecast period, although with a marginal lag on standard small business applications packages.

For a more detailed discussion of trends and projections in vertical market segments, see Vertical Markets for Microcomputer Software, IRD Report #528, published in December 1982.

SECTION 4   THE EDUCATION MARKET

The educational micro software market poses a number of problems in categorization, notably in that (a) much of the software developed for use in educational institutions is marketed to individual micro users via retail outlets (b) much of the software used in educational institutions is not "educational" software (i.e. is not designed specifically for this type of user) and (c) the typical formats and marketing approaches that characterize educational products for younger children and recreational games have begun to merge to create a distinctive category of "educational games". The market for these behaves more like that for recreational games than for other educational products, while the product development skills necessary typically involve close involvement with and beta-testing in school environments.

For these reasons, we have distinguished between three sectors of the educational software market -- the educational institutions market (i.e. involving sales to schools and colleges), the market for educational games (discussed in Section 5) and the market for educational packages for home or "continuing" education by juveniles and adults (i.e. those for whom sufficient attention can be expected without a substantial games element in the programs). However inconvenient, this distinction more accurately reflects the type of problem faced by vendors of educational software in selling to these different types of user than would a division between educational software for schools and for the home.

Significance of Institutional Markets

Worth $44 million in 1983, the market for package sales to educational

institutions is scarcely the largest sector of the micro software
business. Its significance for the market as a whole, however, far
exceeds dollar volume in that:

1) Use of micros at school or in college is clearly going to be a
driving factor over the forecast period covered by this study in promoting
familiarity with micros. Use of micros in educational institutions,
particularly K-12 schools, is a fairly recent phenomenon -- it only
began to develop on any scale in 1980-81 and, as is discussed later in
this section, the hardware base is still very small. However, exposure
is going to increase radically over the next ten years, and all those
currently enrolled in educational institutions with the exception of
preschoolers and the lower elementary school grades can be expected to
be wage or salary-earners or higher education students by 1992, and as
such prime candidates for purchasing micros.

2) Exposure of children to micro use at school is clearly starting to
have major "multiplier effects" in persuading parents to invest in
micros for use at home and/or to purchase micros for such of their
children who may be going on to higher education.

3) The educational institutions market is proving a useful source of
program development talent, and "beta-testing" in an institutional
environment is virtually obligatory for products that will later be
marketed more widely.

4) The educational institutions market is likely to see the first
serious integration of micro software and videodisc-based products,
which we have identified as the key technological trend affecting package
media over the period covered by this study.

The School Market

Current Status of Micro Use in Schools: The school micro market is
potentially vast -- during the 1982-83 school year there were over 45
million students in the K-12 bracket, 90% of them in the 80,000+
establishments in the public school system.

The word "potentially" should, however, be emphasized for two reasons:
the lack of practicality of most teachers with micros, and (by far the
most important) the financial constraints suffered by virtually the
whole educational system.   These factors have contributed to the current
situation -- although there have been a few notable cases of leadership
by district and state-level authorities, the purchase and use of micros
by schools remains very much a "grass roots" phenomenon.   The typical
school micro purchase involves local initiative (by a handful of
interested teachers and/or parents) and improvised funding (PTA donations,
fund-raising drives, small sums squeezed out of school budgets, etc.).
Use will tend to be dependent on the ingenuity and skills of individual
teachers, with parents familiar with computers frequently providing
advice and assistance.

Although familiarity is increasing as a result of numerous programs
initiated by educational authorities and the micro vendors themselves,
financial constraints mean that most school micro bases are small.   Of
the schools surveyed by the Department of Education during the 1981-82
school year, 27,501 possessed one or more micros.   The total installed
base however averaged out at only 3.5 units per school, or one micro for
every 412 students in the school system, and even at the close of the

1982-83 school year, the ratio was still upwards of 200:1. Even with the various discount and "giveaway" programs offered by vendors, and declines in hardware unit costs, it is unlikely that there will be many schools with a micro on every desk this decade.

The predominant pattern of school micro usage for the foreseeable future is thus one of a limited installed base per school with one or more of the following occurring:

1. Classes being rotated for micro usage sessions, either in limited numbers or with groups of students sharing each machine.

2. Classes specializing in computer science or computer training using micros on a more regular basis.

3. The school micro base being open to interested students during free periods or when no classes are in session.

4. Individual students being allocated time on school micros when these are not required for class use.

The result is that while large numbers of students may be exposed to micros, the hardware and software market remains small. (In the 1982-83 school year, for example, Department of Education figures indicate that while 4.7 million students, equivalent to about 10% of the total school population, had access to a micro during that period, the average time per student was only nine hours per year.)

Consequently, many of the qualitative issues raised in·connection with school micro use (e.g. whether computer use threatens traditional educational values) have yet to appear as a significant factor in this

market -- micro use is still a very small part of the average school curriculum.

Patterns of School Micro Use: According to the Department of Education study mentioned earlier, micro use by schools for instructional purposes fell into five main categories: the teaching of computer literacy (33% of schools using micros), computer science courses (23%), the teaching of basic skills (195), learning enrichment (19%) and compensatory and remedial education (14%).

As Exhibit 4-1 shows, there is substantial variation according to the level of school. If a basic distinction is made between the use of micros to support conventional teaching aims and methods (i.e. basic skills, learning enrichment and compensatory and remedial education) and the use of micros as an end in itself (i.e. computer literacy and computer science), it can be seen that the latter increases from 36% of elementary schools to 40% of junior high and 88% of senior high schools. Conversely, micro usage to support conventional teaching approaches is strongest at elementary school level (68% of schools) and weaker at. junior high (50%) and senior high (36%) levels. At senior high level, for example, only 12% of schools using micros indicated that their primary application was for "teaching support" and only 24% combined this with remedial and learning enrichment applications.

Also striking in the figures is the importance attached at all levels to computer literacy.

Although there are variations between schools, the overall pattern is fairly consistent -- the older the students involved, the more likely micro usage is to approximate "real life" applications. This is perhaps

Exhibit 4-1

Schools Using Micros in 1982 - Number & Main Application

	No. Schools	No. With Micros	As % Schools
Elementary	50,800	11,050	22%
Secondary	25,297	15,278	60%
Combined and Other	5,874	1,173	20%
	81,971	27,501	34%

Primary Usage of Micro(s) - as % of schools with micros

	Compensatory and Remedial	Basic Skills	Learning Enrichment	Computer Literacy	Computer Science
Elementary	18%	29%	21%	29%	7%
Jr. High	20%	11%	19%	30%	10%
Sr. High	6%	12%	18%	39%	49%
Combined/Other	19%	6%	4%	34%	49%
All Schools	14%	19%	19%	33%	23%

Source: U.S. Dept. of Education

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unsurprising, given the widespread recognition by teachers, administrators
and parents of the importance of computer-handling skills in the future
lives of most students. Apart from the obvious vocational benefits of
knowing how to use a computer, it is also common to find a less-defined
feeling among those involved with school micro use that some form of
computer literacy will be personally beneficial to students. As one
teacher interviewed for this study commented: "After all, this is the
Information Age".

This feeling that schools should help prepare students for the
increasingly computerized world outside the classroom raises a point
that is often overlooked in discussing the school software market --
that much of it consists of programs that vary little or not at all
from those marketed to commercial users. It is common to find schools
in the grades 6-12 bracket using standard training packages and applica-
tions such as spreadsheets and word-processing. Moreover, there is a
strong school of thought among parents, administrators and teachers
that proficiency in realistic micro applications is more important than
the use of micros for learning enrichment and the like. Vendors selling
into the school market would do well to consider the degree of customiza-
tion required -- the older the students targeted, the stronger the
argument for packages to resemble those that the student will encounter
outside the school environment.

Types of School Software: Traditionally, school software has been
divided into two main categories: Computer-Aided Instruction (CAI) and
"Computer Literacy" i.e. the use of micros to familiarize students with

micros per se. The term Computer-Aided Instruction is, however, mis-
leading. It originates with systems such as Control Data's PLATO or
Hazeltine's TICCIT, which use highly sophisticated simulation-based
approaches as an alternative to other teaching media and methods.
School micro use to date has not followed this pattern. Most of the
packages that are described as "CAI" are in fact used outside the main-
stream of the school curriculum (during periods set aside for tests,
"creative" activities or, with younger students, board games or other
group activities).

A more useful distinction can be made according to the context in
which micros are used: whether use occurs during periods allocated to
a conventional discipline such as English, Maths or Physics, or whether
use occurs during periods specifically allocated for that purpose and
described accordingly as Computer Literacy or Computer Science -- in
practice, Computer Science tends to involve formalized courses and
teaches programming, while Computer Literacy involves the student be-
coming familiar with the operation of pre-written programs. We shall
use the terms Teaching Support and Computer Training respectively to
describe these types of applications.

Teaching Support: Packages that have been designed to be used as
support for teachers can be divided into four main categories: Drill
and Practice (D&P), basic skills training, simulation and modelling
and remedial.

A. Drill and Practice: This has to date been the single most success-
ful type of teaching support software. In contrast to most sophisticated

types of program, D&P substitutes for relatively simple "rote" exercises
which would otherwise be performed on paper or orally. Typical examples
are mathematics exercises in which students must perform given calcula-
tions or language exercises in which they must fill in blanks in sentences,
conjugate verbs or construct phrases. The computer is thus used as a
means of automating a process which would normally involve little or
no substantive participation by the teacher. The task is considerably
simplified in that there is usually a single right answer for any given
exercise, and in that the content would normally be prescribed by course
textbooks.

Unsurprisingly, D&P packages have been fast to catch on -- according
to the Department of Education, 70% of schools using micros for teaching
support applications during the 1981-82 school year indicated that D&P
was their main use. Mathematics and (to a lesser extent) language
teaching were the main classes involved.

B. Basic Skills Training: This is used in classes where the object
is to teach students -- typically in the younger age groups -- basic
skills such as reading, writing, spelling or arithmetic, or which allow
the student to develop and exercise more generalized abilities (e.g.
creativity, decision-making, logical reasoning). While there is no
hard and fast line, the bulk of this type of package is aimed at students
in the K-6 bracket.

Given the age of the students involved, packages for this application
have to involve formats and operating modes designed to retain the user's
attention by making the whole process "fun". This is a rather difficult
concept to define -- the more successful packages have been those that

use combinations of images with text and numbers, and provide continuous
response to the student's actions. Inevitably, the themes and formats
that have been used are similar to those in video and computer games.
Color graphics capability is becoming the norm, and an increasing number
of packages for developing vocabulary skills are also using speech
synthesis.

This area has undergone considerable change over the last few years.
In 1980-81 there were very few quality packages available, and apart
from a handful of sophisticated games such as "The Oregon Trail" the
material available was largely unimaginative. Since that time, there
has been an explosion in the number of products and a noticeable improve-
ment in quality. Packages such as Spinnaker's "Snooper Troops", Reston
Publishing's "Paint" and Optimum Resource's "Sticky Bear" series have
proved to be highly effective in keeping the attention of students and
are regarded by educators as containing a high-quality educational value.

One development that should be mentioned in this context is the
emergence of the LOGO language. Originally developed at MIT, LOGO is
a computer language destined for younger students and which uses a
graphic turtle motif. The language effectively "teaches itself" by
having a student learn via a process of trial-and-error and kind of
logical thinking that will better enable them to handle more complex
problems. Most of the major hardware vendors selling into the schools
market have developed versions of the language for their respective
machines, and a program library is starting to build up.

C. Simulation and Modelling: Simulation and modelling packages fall at the high end of the teaching support market and are aimed at older students, typically in the senior high bracket (the more complex ones overlap into the college market). In contrast to D&P programs, which replace "rote" testing and practice, simulation and modelling programs involve the student more actively, and oblige him or her to make series of interdependent decisions. The parameters are also typically more complex, and presuppose a much higher degree of familiarity with the subject matter.

This type of package has been most successful to date in physical science disciplines. Chemistry simulation was an early area to develop, with the software allowing students to replicate the procedures of and choose between the options available in laboratory experiments. Similar packages are now available for most physical science disciplines, and more recently have begun to appear for such fields as economics, sociology history, psychology and music.

This area has, however, been one of the slowest to develop. Partly this is a function of the lack of quality software available: programs which allow students to perform exercises such as genetic bit-mapping, predicting the behavior of sub-atomic particles or reducing inflation are considerably harder to develop than the average Drill and Practice package. However, it is also clear that the limited installed base in most schools has been a factor. With only small numbers of micros to work with, schools have tended to give priority to computer training applications. Towards the end of the forecast period, this situation is likely to change - with larger installed bases available, disciplinary

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teachers are more likely to demand that their classes get a turn on them.

D. Remedial: This should not be confused with the use of micros for remedial and compensatory education which typically involves allowing slow learners to gain additional practice in curriculum subjects by using micro packages shared with the class as a whole. Remedial packages in our sense are those that use the micro to teach skills that most students do not normally require training in by schools (e.g. shopping, banking and other "survival" skills). This genre has been pioneered by a small firm, Interpretive Education, and appears to be developing a small but useful market niche.

Computer Training: Although the computer training area is commonly divided into sections dealing separately with Computer Literacy and Computer Science, the two frequently overlap. Both approaches involve teaching the students skills that will enable them to operate computers in the kind of environments that they will encounter outside the school. While Computer Science typically involves programming activities, Computer Literacy tends to involve more generalized skills in computer-handling (e.g. using VisiCalc, word-processing or running an accounting package). Four different types of packages have appeared for these applications:

. "Computer Literacy" packages that do not focus on any particular language or application, but which are designed to familiarize the student with the techniques and thinking patterns required for effective computer use. The line between these and the more sophisticated games-type packages for basic skills teaching is in practice difficult to draw.

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Programs such as "Robot War" or "Teacher Plus Pac" which incorporate games techniques and formats are generally regarded as computer training packages, and are used for this purpose.

• Packages aimed at teaching students to program in mainstream computer languages (mainly BASIC, but most business and scientific languages are represented), but which are customized to the age and skill level of the students who will be using them.

• Packages for training in mainstream business applications such as spreadsheet analysis, word-processing or accounting -- these are similar or identical to training packages marketed commercially for adult training in micro use.

• Mainstream business packages.

Current usage patterns suggest that a substantial volume of sales for computer training purposes occurs via conventional business hardware and software distribution channels, and involves business and training packages that are modified only slightly or not at all for school use.

Moreover, it is clear that the degree to which even younger students can handle "adult" applications has not been adequately explored -- several schools interviewed for this study indicated that children as young as ten have proved capable of handling mainstream business packages.

Conclusion: Despite the claims of its proponents, the school software market has to date seen little encroachment by micro-based approaches on teaching methods, practices and media -- mainstream teaching still uses conventional print courseware, having recourse to micro packages only occasionally. The only exception to this is the Computer Training courses

offered by an increasing number of schools, particularly at the senior
high level, and which are seen primarily as a form of vocational training.

Marketing to Schools

The fragmentation of the schools market (both geographically and
organizationally), the limited installed base of most schools and their
lack of money have combined to make the economics of marketing much
less attractive than for other micro package markets.

Even allowing for some uneven distribution of the school micro
installed base (more affluent areas are typically larger micro purchasers),
it is still rare to find schools with even a dozen micros. With most
packages running in the $20-150 bracket, the economics of direct
marketing are daunting. Moreover, the way in which school micro use has
developed, with most purchases initiated and made at local level and
many packages being used for the kind of activities for which teachers
have traditionally exercised considerable discretion in materials
purchases, has meant that there is no standardization for hardware or
software.

The predominant factors influencing package choice to date have
been word of mouth between teachers, write-ups in educational periodicals
and exposure to products at training sessions and seminars organized
(typically on a shoestring basis) by various educational authorities
and voluntary groups. While most of the micro vendors have also offered
sessions of their own for teachers and administrators, these have not
had much impact, and have rarely proved an economic proposition.

To make matters worse, the poor quality of much of the software   .

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offered in the market's early days has created a distrust of all packages
that is still far from being dissipated - schools remain a hard and
expensive sell.

The problem for vendors has thus been to market "on the cheap" if
they are looking to make current profits (and as most of the suppliers
until recently were small outfits, this was not far from their minds).
A large number of geographically isolated points of purchase have to be
served which are unlikely to buy more than a few packages at a time.
While hardware purchases have tended to be made from local retailers,
the same has not occurred for software - most teachers feel uncomfortable
with retailers who do not understand their problems and requirements,
and retailers have equally been reluctant to stock items for which such
a slow and small market exists. The result has been that most vendors
have resorted to shoestring advertising and direct mail, and efforts to
get themselves written up in the right publications. Service and support
inevitably has left much to be desired.

As a result, the situation has been characterized as one in which a
weak market and weak suppliers have been feeding upon themselves.

There are, however, signs that this situation is changing as a result
of four factors:

The appearance of "heavyweight" suppliers with considerably greater
resources and credibility than the "garage shops" that used to
characterize the business, notably (i) educational publishers (ii)
suppliers of audio-visual materials (iii) individual educational
institutions that have developed expertise in this area and (iv) larger

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software houses diversifying into this market from business and/or games packages. Of these, the educational publishers are by far the most significant - although slow to enter the market, most of them have recognized that this is an area that they have to be in. Equally, most of them recognize that it will be some time before they are likely to make much money out of it, but are prepared to carry the costs of development, testing, debugging and distribution as a long-term investment.

Changes in the distribution picture. The entry of the educational publishers and audio-visual suppliers has brought their direct marketing networks into play. In addition, the last few years have seen distributors of audio-visual equipment and school supplies and furniture enter the field, initially as hardware vendors but increasingly adding software packages to their lines. Both groups have been hit by flat markets for their original lines, while the 50+ audio-visual equipment dealers who have become involved have also seen micros become the subject of the kind of fund-raising drives that used to be reserved for their products. By carrying software packages as add-ons to other lines of business, these groups have gone a long way towards overcoming the problems of distribution economics for this sector.

Greater participation by District and State authorities. Although there were a number of early moves in this direction (notably the Minnesota Educational Computing Consortium, which centralized purchases and training for the state's school system), most authorities have been slow to take a role in school micro use. This is now changing as a result of two factors: (i) pressure from individual schools - while most teachers

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remain jealous of their independence in selecting and using micro
hardware and software, there has been extensive lobbying for higher-
level authorities to use their leverage to obtain better discount and
support terms from vendors and (ii) the appearance on the scene of the
large educational publishers, who have traditionally dealt with these
levels of the school system.

The increasing credibility of school software. Over the last 12-18
months, it is generally recognized that packages have improved greatly
in quality. While much of this can be attributed to the entry of suppliers
able to handle the costs involved in producing a quality package, it is
also a function of a kind of "learning curve" in the industry - procedures
have been established, and suppliers have developed a better feel for
the market's requirements.

The result of these developments has begun to pick up momentum, with
better-quality software and the emergence of a distribution infrastructure.
that has the potential to overcome the unattractive economics of direct
marketing. Once again, however, the word "potential" should be stressed. -
The crucial limitation to market growth is still the financial straits of
the American education system.

Vendors

For a small market, educational packages for the K-12 bracket have
attracted a large field of suppliers, very few of whom can be making
much money out of it. For most of them, however, this is acceptable -
they have entered the market as a long-term investment and/or with an

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eye to potential consumer sales of educational packages. The suppliers can be divided into six main groups: micro vendors, educational publishers, suppliers of audio-visual materials, individual educational institutions, software houses and smaller, specialist firms.

Micro Vendors: With competition from more and more hardware suppliers heating up in business and consumer markets, the micro vendors have been devoting an increasing amount of attention to schools of late. All of them offer special discount structures and training, familiarization or information programs of various sorts for teachers and administrators.

Apple, although enjoying the largest installed base in schools, has been slow to offer its own programs. Its current focus is on the younger age bracket (preschool and lower grades), with software developed in-house and in cooperation with leading educational organizations. It scored a notable coup in signing up the Boston-based Children's Television Workshop (producers of the "Sesame Street" TV series) to develop software using the characters of the popular children's TV series. 16 packages are planned, the first of which, "Mix and Match" appeared in February.

Tandy claims to have been the first micro vendor to seriously target the schools market, and established a special division for this purpose more than three years ago. The company fields a dedicated sales force and prides itself on the programs it runs for teachers from special regional offices. Tandy markets more than fifty packages covering a wide range of disciplines and age-groups, both developed in-house and by

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third parties. One of its packages, the K-8 Math program for drill and practice applications, is one of the most successful products in the market, and it also markets some well-regarded computer literacy packages, notably the Computers Past and Present and Computer Education series.

Much of the company's efforts are focused on younger age groups, stressing the color graphics capabilities of its Color Computer, and the Tandy version of LOGO.

Commodore has an image problem. Although the company has regarded this market as key for a long time, it continues to suffer from a lack of credibility as a "serious" supplier for educational applications. In an effort to deal with this problem, the company has donated upwards of $15 million in hardware to educational institutions, donated more than 50 programs to the public domain and opened more than 250 Educational Resource Centers at the school district level or in colleges.

Commodore's programs cover most aspects of the educational market, although quality is variable and the company has yet to achieve much visibility in this area, or indeed any notable packages. This may change if its numerous negotiations with educational publishers prove fruitful.

Atari has had the same kind of credibility problems as Commodore, but has been more effective in dealing with them - several major orders from school districts and one from the U.S. Department of Defense for its Dependents' Schools helped.

Most of Atari's efforts have been focused on what it regards as its main market - younger age groups, overlapping both the school and home markets. The company sells more than twenty packages, priced mostly in

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the $15-30 range and covering such subjects as basic skills, mathematics, geography, history and more general educational games.

Texas Instruments, with ambitious goals in the low-end micro market, has been running hard for market leadership here as elsewhere. Its packages are targeted at both the school and home markets, and are intended for use by both adults and children. The company fields more than 150 packages ranging from $14 to $60 and covering most of the bases in games-type, drill and practice and more sophisticated applications. TI claims that its line provides complete curricula for grades 3 through 12, while other products are targeted at preschoolers (literacy and general educational games) and at the adult "continuing education" market.

IBM. Of course. Despite its success in the business PC market since 1981, IBM has been slow to approach the educational market. A number of programs have been developed for schools by IBM subsidiary Science Research Associates, and the company has also loaned 300 PCs equipped with speech synthesis to school districts during the 1982-83 school year to beta test a third-party program (developed by a small Florida firm, J.H.M. Corporation) designed to teach basic literacy skills. In addition, IBM has also announced discount and loan programs for this market.

Meanwhile, everyone waits. It is generally accepted that IBM's credibility and marketing strengths will enable it to dominate the schools hardware market, and before too much longer it is likely that the "Peanut" and networks will be unleashed on the educational system. Although it is negotiating with several educational publishers, IBM is likely to limit its educational packages to a number of key products,

and rely on third parties to supply the rest - the more successful of these will be picked up and marketed by IBM.

Educational Publishers: After a slow start, most of the major educational publishers are now in the field or are preparing to enter. Among the leaders:

Harper and Row. With diversified interests in both educational and consumer publishing, Harper and Row is targeting both the school and home markets for educational packages. The main focus of its school strategy is a series of mathematics packages aimed at high school and college classes and covering such topics as algebra, trigonometry and calculus. These are being developed in cooperation with the CONDUIT program, a program for the development of educational software operated by the University of Iowa and described later in this section.

International Publishing Company. A British-based publishing conglomerate, the International Publishing Company (IPC) puts out a wide range of educational periodicals and books in both the U.S.A. and Europe. The company has entered the software market via a specialized subsidiary, Wadsworth Electronic Publishing. The company markets a pre-calculus algebra package, the Electronic Blackboard, targeted at the high school market and a combined software and print statistics course, STATPRO.

McGraw-Hill. With revenues of over $1 billion, more than 20,000 educational products (including textbooks, periodicals, basic skills teaching materials, audio-visual products and now software) and a high-level corporate commitment to electronic publishing, McGraw-Hill is well on its way to becoming one of the leading forces in this market.

The company markets a wide range of educational software products via its Gregg and College Divisions, focused mostly on "serious" applications for older students. Its most popular product is probably its Computer Power package, which uses games-type characters and a games format to teach PASCAL. In addition, the company markets a series of packages for accountancy teaching at both high school and college levels. The packages consist of modified standard accounting software, and oblige students to do more in the way of manual procedures than would normally be the case (the idea being to familiarize the students with both basic accounting principles and procedures and the operation of computerized accounting systems). More recently, McGraw-Hill has introduced "Enterprise Sandwich Shops", a simulation program for high school and college-level economics courses - the program familiarizes students with basic principles of economics by having them operate sandwich shops while confronting the vicissitudes of a modern economy.

<u>Milliken Publishing.</u> With more than twenty years in the educational publishing business, Milliken first entered the educational computing field via a timeshared service as early as 1977. Since then, the company has expanded into the micro package business via a new division, Edu-Fun. As the name suggests, the company's focus is on games-type educational programs for younger age groups, bracketing schools and the home market. It also markets a series of drill and practice packages in math and language arts for grades 1 through 8.

<u>Prentice-Hall.</u> A major book publisher with extensive lines for both the educational institutions and consumer markets, Prentice-Hall markets 17

packages, including math and language arts products for elementary and high schools, games-type literacy programs for young children and simulation and modelling packages for high school students.

Scholastic Inc. A leading publisher of educational periodicals for both teachers and students, Scholastic Inc. entered the school market in 1982 with products co-developed with Tandy, TI and Atari. These·include a series of "fun" learning products for younger age groups marketed under the WIZWARE label and a series of word-processing and computer training packages aimed at the high school, college and adult "continuing education" markets. In addition, Scholastic Inc. has experimented with a disk-based periodical for class use.

Science Research Associates. An educational publisher since 1938, Science Research Associates (SRA) is now a subsidiary of IBM. Apart from some development for the IBM PC, however, the relationship between SRA and IBM has been largely arm's length. SRA markets a series of its own products, including drill and practice packages for mathematics and language arts and BASIC training programs. Its attempts to add a "fun" dimension to its product line (e.g. "Arithmetic Games" for the IBM PC) have not been notably successful, but it remains a leader in drill and practice and administrative packages for the schools market.

Random House. Another educational publishing "heavyweight", Random House's package line is largely developed out-of-house (notably by a specialist firm, Bertamax Inc). The company markets more than 50 products, including a computer training course developed by researchers at the Ohio Computer Consortium, basic literacy packages for elementary and junior

high school levels and more sophisticated language arts programs for elementary school students and remedial applications for older students.

In addition, Addison-Wesley, Harcourt Brace Jovanovich, Houghton-Mifflin, Scott-Foresman and Xerox Educational Publications are active in or entering this market.

Audio-Visual Materials Suppliers: The demise of the audio-visual market has prodded several major suppliers of audio-visual materials to diversify into micro software, notably Encyclopedia Brittanica Education Corporation and Walt Disney Productions - both of whom possess strong name recognition and credibility in this field. Encyclopedia Brittanica has weighed in with 12 packages covering the whole K-12 bracket - topics include basic literacy, math, physics, biology and computer literacy. Walt Disney has not as yet made much of an impact on the market, although its considerable library of characters and themes and the technical and creative resources of its film divisions suggest this is unlikely to remain the case.

Educational Institutions: The penetration of micros into the educational sector and the past lack of quality software has inevitably resulted in many programs being developed by end-users. There are a lot of packages developed by individual teachers or members of faculties of higher education institutions involved with education and/or computing, and it would be impossible to track them all. Quality is variable, and such packages often circulate from school to school without going through the same kind of distribution channels used by better-established vendors.

A number of institutions that began developing their own software have, however, discovered that this can represent a useful source of income, particularly if they team up with a micro vendor or educational publisher who can provide wide distribution for their products. Notable examples of this have been the Canadian Sheridan College and New York-based Bank Street School, which have developed lines of packages for the teaching of mainstream applications such as word-processing and accounting and for vocational training. Bank Street's Bank Street Writer package, a simplified word-processing program, has also made it into the home market via the distribution resources of Broderbund.

Other notable developers include:

CONDUIT. Operated by the University of Iowa, the CONDUIT program has developed a wide range of sophisticated simulation and modelling packages for college and high school use covering more than twenty disciplines. In addition, the program's marketing arm, Queue Inc., carries other packages developed by third parties in these and areas such as vocational and remedial education.

MECC a.k.a. the Minnesota Educational Computing Consortium. One of the pioneers in state level cooperation of school micro use, MECC has also diversified into distributing packages developed by individual teachers and institutions. Its inability to supply much in the way of support and the availability of more "professional" packages have, however, prevented it from being much of a force in the market.

Software Houses: With an eye on the budding consumer market for educational software packages, and with the benefit of

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established distribution channels, some of the larger software houses
with games and business lines have also been adding educational titles.
Among those who have entered this field are Broderbund (20 titles,
including the "Bank Street Writer" mentioned earlier), Microsoft, Muse
Software (with its popular Robot War program, aimed at computer literacy
teaching and using a games type format) and Sierra On-Line.

Specialist Firms :   Similar to other parts of the applications
software industry, the school packages market is home for a

large number of small firms, some of whom show the same propensity for
sudden death described in relation to vertical market suppliers. While
smaller firms had a clear run in the early days of the market, the
appearance of so many "heavyweights" has led to a weeding out of many
of the weaker suppliers. Those that have survived have done so by talent,
teaming up with larger organizations able to supply distribution and/or
by developing specialized niches. For example:

Spinnaker Software. A Cambridge, Mass. start up, Spinnaker Software
has distinguished itself by a flair for both program development and
marketing. From its initial hit "Snooper Troops", a whodunit-style
educational game, the company has broadened its line to seven titles
targeted at younger age groups and bracketing the schools and home
markets. Spinnaker's products are attractively packaged and well
marketed, with pricing in the $30 to $60 range.

Optimum Resource Inc. This company's principal asset is one Richard
Hefter, an author and illustrator of children's books. Hefter created a
character, "Sticky Bear", used as the main motif for a series of programs

targeted at preschoolers and teaching basic literacy and numeracy
skills. Distribution is by Xerox Educational Publishing.

Micro Music. Set up in 1979 by a husband and wife team, this Kalamazoo,
Michigan-based firm targets music teachers at all levels of the
educational system and the individual self teacher. The company markets
a series of six packages teaching music appreciation and composition
skills. It claims more than 1500 installations, and also offers a
number of other educational packages.

It would be impossible to list all of the smaller firms in this market,
many of which are recent start ups. Among those who have attracted
attention are Sterling Swift Publishing, The Learning Company and Reston
Publishing.

The Mainstream Courseware Stakes

With so many competitors in a small market, competition is becoming
increasingly fierce. In the long run, however, growth in the school
market will depend not merely on selling to existing types of customers,
but on breaking into the market for mainstream courseware. To date,
most of the school market has been in one of two areas: credit courses
in computer training and "discretionary" materials. The vast majority
of schoolwork continues to be performed with printed materials.

   Educational publishers have traditionally divided the print market
into two areas:

Discretionary Materials: These will be ordered and purchased at the
level of the individual school, typically as supplements to mainstream
course materials and/or for periods intended to provide a break in the

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basic curriculum. Examples would be student periodicals designed for classroom use or as homework projects and non-standard books used as "readers" (most audio-visual materials also fall into this category). While higher level approval may be necessary in some cases, the persons who have to be "sold" are the teacher and school administrator at local level. As a rule of thumb, this market is considered to consist of items up to $1,000.

Standard Course Materials: This, of course, is where the real money is   at school district and state level. Success in this market has tended to go to larger publishers that have solid track records, established reputations and the necessary expertise in the development of educational materials. Publishers typically work closely with the authorities and field direct marketing forces.

The problem is that virtually the entire school software market to date has been in "discretionary" materials, and breaking open the mainstream market is not going to be easy. Apart from the obvious difficulty of persuading higher level authorities to place large orders for software packages in place of textbooks, there are still not enough micros in schools to make this a viable proposition.

The stakes are, however, high. While it is unlikely that micro-based materials will ever completely replace print materials, it is feasible to envisage combined print and computer courseware for numerous subjects such as mathematics and the physical sciences becoming the norm. Once this happens, vendors will be able to move from selling discrete packages for "discretionary" use to selling complete lines of programs forming

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an integrated series for successive grades and for particular stages
of the curriculum within grades. (TI claims to offer such a series,
and that it has proved to be very effective in a few test schools which
the company has equipped with large numbers of micros).

This is going to happen eventually, but it is still not clear how
fast. Again, the key variable is financial, and there is unlikely to
be much change for at least the next few years. During the second half
of the decade, however, this situation could change rapidly — we shall
return to this point later in this section.

Criteria for Success

The problems faced in marketing to schools, and the criteria for success,
are in many ways similar to those described earlier for the vertical
business market. Vendors must combine specialized knowledge of the
sector with program development skills (typically an expensive process)
while selling to a diffuse market i.e. while keeping distribution
overhead minimal.

Targeting: Regardless of the age group that an organization is
trying to reach, there are three main approaches that can be taken
to target this market:

1) Make it fun.

2) Go by the book. Replicate as closely as possible on software
   the formats and procedures used in printed course materials (most
   obviously with drill and practice packages, but this approach is also
   appropriate for many simulation and modelling programs e.g. those
   duplicating physical science experiments which are part of basic

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disciplinary curricula. As a rule of thumb, if students are going to sit an exam on this, better not to experiment).

3) Computer Training. While the degree of variation that the vendor may use in product content and format will depend on the type of course, how students are graded and the like, Computer Science and the more formalized Computer Literacy courses will typically require a "businesslike" approach, and it will be assumed that students can get by without elements of "fun".

These different approaches represent different sets of vendor strengths: the skills required for say, a mathematics drill and practice package or a BASIC training package are very different from those required to develop a package capable of retaining the interest of preschoolers while teaching them to spell (although the distribution problems are the same for both).

In general, anything that involves a "fun" content is very talent intensive, and the companies that have been most successful have been those that have been able to maintain entrepreneurial, creative working atmospheres. Companies using the other types of approach are more likely to require solid, in-depth knowledge of the subject in question rather than "flair".

Product Development: Regardless of the approach adopted to address the school software market, all of the major vendors and the more successful smaller ones have typically found that few people possess all the skills necessary for successful product development. Normally, it will be necessary to assemble teams containing individuals with a strong

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educational background and experience and others with the required
programming skills. There are two variants of this: the "author"
approach, whereby the task of the programming specialist(s) is basically
to translate the author's concept into a program (the author will
usually be an educational specialist) and the teamwork approach, whereby
two or more individuals with educational and programming skills will work
closely together at all stages of the process. Both variants have
produced good and bad programs.

However the development process is conducted, it is virtually
obligatory to engage in extensive beta testing in a classroom environment,
and successful vendors have tended to be those that did this thoroughly,
working with one or more schools and revising and retesting products at
least three or four times before release. As in the vertical business
sector, several vendors also use a "panel" approach, with a group of
educational specialists contributing to the development of a product.

Distribution: The object of an effective distribution system is
to obtain as wide exposure as possible for a product as cheaply as
possible, and typically that will involve one or more distribution
channels reaching schools directly. These include hardware vendors,
educational publishers, audio-visual equipment distributors and school
supplies and furniture dealers. In addition, independent representatives
have also begun to put in an appearance. The range of permutations here
is considerable, and virtually all of them have been translated into
practice.   One educational publisher interviewed for this study, for
example, indicated that the company used a combination of direct sales,

audio-visual equipment distributors, school supplies and furniture dealers, retailers and independent representatives depending on the geographical area.

All successful products, however, have to involve extensive overhead in development and distribution, and few companies have attempted to integrate the entire process. Those with established distribution networks, the micro vendors and educational publishers, have typically supplemented their in-house lines with quality products from educational institutions and/or smaller specialist firms, while some of the latter have by-passed them to deal directly with local or regional distributors and dealers. One popular practice has been co-development, with one side typically providing the concept and educational knowledge and skills and the other capital, distribution and software development expertise (this approach has proved particularly attractive to the micro vendors).

There are thus no hard and fast rules to the school distribution game, and the more successful vendors have been those that have taken advantage of the range of permutations to set up the optimum combination of coverage and cost for their particular products.

Market Outlook: As discussed earlier, the primary constraint on the growth of this market is financial, reflected both in the limited numbers of micros available and in tight school budgets for any form of materials purchase.   Moreover, until micro usage breaks into mainstream teaching time and software is recognized as a legitimate medium for courseware, the schools micro hardware/soft-ware market will remain primarily within the field of school

"discretionary" purchases except where specialized computer training courses are offered.

Nevertheless, the whole issue of micros in schools has attracted an enormous amount of attention over the last year or so in the wake of the Apple "giveaway" proposal (still going through Congress at the time of writing), and Apple's publicity on the issue has clearly touched political nerves. Over the next two years, it seems probable that other vendors (notably IBM) will follow suit, and that tax breaks and other programs involving private companies in educational micro use will do much to open this market up.

In addition, advances in micro technology (notably the appearance of the $600 low-end micro, micro networks and multi-user systems) can be expected to reduce the average cost of micro hardware for schools fairly dramatically over the next five years.

Consequently, we anticipate a major expansion of the schools micro base over the forecast period, rising from around 220,000 units at the end of the 1982-83 school year to over 1.2 million units by the end of the 1987-88 school year, equivalent to an average of 12-13 units per school. The growth of micro usage after that time will depend increasingly on the extent to which micros are accepted as part of mainstream course teaching methods, and while this is a difficult development to predict (it will inevitably raise all of the "qualitative" issues in school micro use that have not yet had much impact, and the provision of adequate hardware bases will depend heavily on the government funding outlook), it seems likely that this will have started to occur by the end of the forecast period, probably in the 1990-93 timeframe.

<u>School Software Spending</u>:   Despite the rapid growth of the school
micro base, it is by no means clear that this will result in a
large-scale "boom" in software packages.   With only limited numbers
of micros at present, the cost of providing packages is a minor
part of total spending, with typical educational packages running
in the $20-150 bracket against thousands of dollars for a micro
configuration.   However, once a school has, say, ten micros, the
cost of adding a new package for each unit for applications such as
drill and practice or computer science (where prices are typically in
the $125-160 range) starts to run into the $1,000-$2,000 bracket.   Given
that hardware costs are clearly going to decline over the next few years
for this sector, this makes additional package purchases an alternative
to buying another micro. At present, the indications are that the vast
majority of school decision-makers would rather buy another micro than
add new software.

Moreover, there is clearly an absolute limit to the spending of most
schools on micro hardware/software. Even allowing for fund-raising
drives and the like and hardware "giveaways" from vendors, few schools
are likely to be able to afford budgets of more than $10,000 a year on
micro-related purchases, and the vast majority will be considerably less
than that (if every school in the country spent $5,000 on micro software
a year, for example, it would still mean a market of no more than $500
million).   Whereas in most micro package sectors there is a certain
amount of elasticity in software budgets (business purchases, for example,
are commonly justified on grounds of productivity, etc. and consumer
spending on software may intrude into monies that would normally be

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allocated for entertainment, leisure time activities and the like), in
the school market there is a definite limit in terms of available funds
and prior claims on them. For that reason, we do not anticipate that
school spending on software will exceed $500 million annually this
decade, although the beginnings of use of micro-based courseware for
mainstream curricula will start having an effect on the market towards
the end of the decade and will result in major growth in this market during
the 1990s.

Forecast Assumptions: In projecting the market for school software
purchases on a ten-year basis (Exhibit 4-2), the following assumptions
were made regarding the school market:
- Absolute funding constraints, as described above.
- Faster growth over the 1983-88 period in basic skills and computer
literacy packages than other major sectors, due both to lower package
prices and current interest levels in schools.
- A slow start for simulation and modelling packages, but with the
market for these picking up more in the 1986-88 timeframe as larger
school micro bases cause disciplinary teachers to push for these for
"discretionary" activities for their own classes.
- Relatively slow growth in computer science teaching packages, as these
have tended to be more standardized than in other sectors, and teachers
are less likely to experiment with new packages, and in drill and
practice packages - the early market leadership of these is more a
reflection of a lack of adequate products of other types than of real
market demand.

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Exhibit 4-2

1983-93 Market Forecast: Schools

Units (thousands)	1983	1984	1985	1986	1987	1988	1990	1993
Teaching Support								
Drill & Practice	120	185	270	440	575	680		
Basic Skills	126	370	660	950	1565	2200		
Simulation/Modelling	9	15	39	89	180	325		
Remedial	1	2	3	5	7	8		
	253	572	972	1484	2327	3213	4800	5200
Computer Training								
Computer Literacy	106	225	440	820	1350	1900		
Computer Science	64	93	145	250	330	405		
	170	318	585	1070	1680	2305	3600	4300
Mainstream Courseware	-	-	-	-	-	50	500	2500
Total	423	890	1557	2554	4007	5568	8900	12000

Average Price ($)	1983	1984	1985	1986	1987	1988	1990	1993
Teaching Support								
Drill & Practice	140	140	140	130	125	115		
Basic Skills	55	45	35	30	30	30		
Simulation/Modelling	100	100	110	125	130	130		
Remedial	165	165	165	155	150	145		
Computer Training								
Computer Literacy	85	85	80	70	65	60		
Computer Science	150	150	150	140	130	125		

$ Millions	1983	1984	1985	1986	1987	1988	1990	1993
Teaching Support								
Drill & Practice	17	26	38	57	72	78		
Basic Skills	7	17	23	29	47	66		
Simulation/Modelling	1	2	4	11	23	42		
Remedial	-	-	-	1	1	1		
	25	45	65	98	143	187	275	325
Computer Training								
Computer Literacy	9	19	35	57	88	114		
Computer Science	10	14	22	35	43	51		
	19	33	57	92	131	165	235	260
Mainstream Courseware	-	-	-	-	-	4	40	200
Total	44	78	122	190	274	356	550	785

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• Unit pricing remaining stable in most categories, but with declines in basic skills and computer literacy packages due to competition by vendors of these products in broader consumer markets. However, the appearance of larger micro installed bases of micros in schools will lead vendors to make more use of discounts for multiple purchases and/or "special offers" such as Apple has recently introduced for sales of Apple IIs to educational institutions, resulting in an average unit price decline that will become noticeable in the 1986-88 timeframe. The only exception to this will be in simulation and modelling packages, where a larger market over the same period will probably result in an average unit price increase due to the appearance of higher-priced and more sophisticated items.

• The beginnings of a market for software-based mainstream courseware materials in the last years of the decade - we anticipate that this trend will only develop on a large scale after the forecast period, but will have created a much greater market in unit and dollar volume terms by the end of the century.

The College Market

Although there is some overlap between the types of software used in schools and those selling into the college market (notably more sophisticated disciplinary and computer training packages), the college market remains distinct for several reasons:

• The vast majority of users are adults and, particularly in "numbers" subjects, tend to buy and use micros for purposes that are not directly related to their curriculum.

• The college market is already a heavy user of conventional mainframe and mini-based systems. Large institutions, for example, will typically have at least one mainframe for administrative computing and centralized computing services for training and/or research purposes, while individual faculties and departments will also maintain their own hosts; smaller institutions will usually have a smaller mini-based system such as an HP 3000 or DEC PDP-11 or access to a remote timesharing service.

• The college market is more concentrated geographically - according to the U.S. Department of Education, average enrollment in institutions of higher education in 1980 (the most recent year for which detailed figures are available) was around 3,750 persons, and although there may be some geographical dispersion of facilities, the end result is still a much higher degree of concentration than is the case for institutions in the K-12 bracket, which simplifies the distribution picture.

• Because of the age and relative sophistication of the college student, college authorities are rarely interested in dictating how micros should be used, the assumption being that this falls within the sphere of the students' discretion as to how they perform the work required of them as part of their courses.

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<u>Market Structure</u>:   According to the U.S. Department of Education,
there are more than 13 million students enrolled in institutions
of higher education, of which there were in 1980 some 3,226
(See Exhibit 4-3).   Of these, as Exhibit 4-4 shows, at least 3
million were enrolled in subjects such as architecture and
environmental design, physical and biological sciences and engineering
which tend to involve computing. Moreover, these sectors are major micro
users outside the educational environment, with the result that students
in these disciplines can reasonably expect to be using a micro for
professional purposes at some time in their future careers.

Unlike the school market, the majority of micro purchases in college
environments are made by individual students, and software purchases tend
to involve materials for programming, scientific and engineering software
and more general types of package which can be obtained from run-of-the-
mill retail outlets and by mail order with little difficulty. Although
a handful of universities have begun to make possession of a micro
obligatory and are offering computer literacy courses, this development
seems unlikely to spread very far or very fast - most institutions are
aware that $3,000+ is a large sum for many of their students, and few
of them have the resources to purchase bulk lots for them. Moreover,
most college courses in computing, either for computer science or for
specific disciplinary applications, involve the use of host-based systems
and terminals. To date, most higher education institutions have focused
more on expanding terminal bases and/or moving to more powerful hosts.

Exhibit 4-3

Colleges By Size and Type

Control of institution and size of enrollment	All institutions		Universities		All other 4-year institutions		2-year institutions	
	Number	Enrollment	Number	Enrollment	Number	Enrollment	Number	Enrollment
1	2	3	4	5	6	7	8	9
Public and private institutions	3,226	12,096,895	160	2,902,014	1,797	4,668,594	1,269	4,526,287
Under 200	304	33,453	0	0	242	26,724	62	6,729
200 to 499	395	138,141	0	0	227	78,177	168	59,964
500 to 999	530	389,632	0	0	327	239,756	203	149,876
1,000 to 2,499	845	1,346,876	0	0	496	785,172	349	561,704
2,500 to 4,999	449	1,574,085	9	35,467	236	828,098	204	710,520
5,000 to 9,999	367	2,587,667	38	299,008	160	1,091,673	169	1,196,986
10,000 to 19,999	228	3,085,315	50	720,731	92	1,197,700	86	1,166,884
20,000 to 29,999	75	1,736,647	37	872,865	14	321,071	24	542,711
30,000 or more	33	1,205,079	26	973,943	3	100,223	4	130,913
Public institutions	1,493	9,457,394	95	2,154,283	457	2,974,329	941	4,328,782
Under 200	3	401	0	0	0	0	3	401
200 to 499	43	17 015	0	0	12	4,490	31	12,525
500 to 999	135	102,690	0	0	19	14,236	116	88,454
1,000 to 2,499	404	676,052	0	0	92	164,037	312	512,015
2,500 to 4,999	312	1,112,327	1	3,756	113	417,937	198	690,634
5,000 to 9,999	297	2,113,371	12	102,317	118	826,809	167	1,184,245
10,000 to 19,999	199	2,716,925	27	424,515	86	1,125,526	86	1,166,884
20,000 to 29,999	69	1,587,431	31	723,649	14	321,071	24	542,711
30,000 or more	31	1,131,182	24	900,046	3	100,223	4	130,913
Private institutions	1,733	2,639,501	65	747,731	1,340	1,694,265	328	197,505
Under 200	301	33,052	0	0	242	26,724	59	6,328
200 to 499	352	121,126	0	0	215	73,687	137	47,439
500 to 999	395	286,942	0	0	308	225,520	87	61,422
1,000 to 2,499	441	670,824	0	0	404	621,135	37	49,689
2,500 to 4,999	137	461,758	8	31,711	123	410,161	6	19,886
5,000 to 9,999	70	474,296	26	196,691	42	264,864	2	12,741
10,000 to 19,999	29	368,390	23	296,216	6	72,174	0	0
20,000 to 29,999	6	149,216	6	149,216	0	0	0	0
30,000 or more	2	73,897	2	73,897	0	0	0	0

[1] Data represent those institutions and enrollments which are reported in the survey of *Fall Enrollment in Higher Education, 1980*

SOURCE. U.S. Department of Education, National Center for Education Statistics, special tabulation from the survey of *Fall Enrollment in Higher Education, 1980*

Source: Department of Education, National Center for Education Statistics

Exhibit 4-4

Enrollment in Higher Education By Subject: 1980

Architecture/Environmental Design	74,872
Business/Management Sciences	1,693,460
Engineering	620,248
Physical Sciences	174,993
	2,563,573
Agriculture/Natural Resources	145,025
Biological Sciences	279,640
Dentistry	22,929
Law	119,757
Medicine	74,879
Veterinary Medicine	8,164
Other Subjects	9,011,407
	12,225,374

Source: U.S. Dept. of Education

The result has been that, while micro use has become widespread at many institutions (and there are few institutions of any size that do not have a body of micro users), usage has tended to be personal rather than organized. Typical applications include the use of word-processing packages for paper or study drafting, scientific and engineering students using micros for their own calculations and business students learning how to use a micro for later on in their careers.

This diffusion has major implications for the software package market - rather than being a "push" market like schools (i.e. requiring a high degree of direct marketing and "hand-holding"), it is more a "pull" market (i.e. potential purchasers can be expected to take the initiative in deciding on software purchases, and to seek out appropriate outlets). This pattern is likely to hold even with the growth of software-based standard course materials, described below - procurement of necessary materials is typically the responsibility of individual students, although college bookstores and other specialized retail outlets, or special ordering procedures will usually be available to obtain them.

College Courseware: By courseware here we mean materials which are an integral part of a curriculum in a specific discipline, and which students will typically be required to possess or at least have access to.

To date, this has been a little-developed area, largely due to installed base constraints. With most institutions reluctant to make possession of a micro obligatory, and equally reluctant to provide them themselves, something of an impasse has developed even in sectors which

one would expect to be early users of micro-based courseware (e.g. physical sciences and engineering). Moreover, with the exception of a few institutions where individual faculties or departments have pioneered micro use, there has been little pressure from end-users for this type of software. The main stimulus to the appearance of courseware packages has been the actions of educational publishers and leading institutions with educational software development programs (notably the University of Iowa's CONDUIT program) which are anticipating demand rather than responding to it, and the majority of whose products are intended to bracket senior high school and higher education institutions in such subjects as computer training, physical sciences, mathematics and statistics and economics.

Vendors: A number of vendors, notably the educational publishers, field lines of simulation and modelling packages targeted at both upper high school grades and the college market, notably Harper and Row, McGraw-Hill and Harcourt Brace Jovanovich, but to date only one vendor, John Wiley and Company, has seriously pursued this market. The company's background is in scientific books and periodicals (it markets several hundred highly specialized periodicals covering scientific and technical subjects), and is the unquestioned leader in this field. Its micro packages include a range of drill and practice and simulation products for chemistry and biochemistry, and in 1982 the company also broke new ground with a videodisc-based physics teaching system. The company's philosophy is to focus on micro- and videodisc-based approaches for science subjects that can be substituted for more expensive experiments and demonstrations.

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<u>Distribution</u>: At present, most packages going into the college market
are via retail outlets, either conventional hardware and software re-
tailers or college bookstores that have diversified into this field, and
this pattern is likely to remain the norm. While there is clearly a
trend among hardware vendors to offer special discount programs to
institutions and/or students, and to focus on selling bulk lots, the
software market is unlikely to go the same way. Apart from general
types of packages such as business, systems and programming products,
most purchasing of packages in this sector is likely to remain fragmented,
with individual faculties and departments retaining autonomy as to
what types of packages are prescribed or recommended for students.

As mentioned earlier, this market can be described primarily in
"pull" terms, which means that the main distribution problem for vendors
is to ensure adequate geographical access to outlets. This problem is
simplified by two factors:

1) The concentration of most higher education students in campus-type
environments, which are already served by specialized stores and/or
retail outlets which combine general merchandising with educational
materials (one vendor contacted for this study, for example, estimated
that there are at least 2,000 on-campus or nearby college stores which
are potential package outlets). Moreover, in areas where there is a high
concentration of students, conventional hardware and software retail
stores often offer product lines which reflect student requirements to
a greater degree than is the norm elsewhere.

2) For smaller concentrations of students, there are also typically

recognized channels for the procurement of educational materials (e.g. recommended or authorized bookstores, centralized ordering procedures), and students are more accustomed than the average consumer to track down the right outlets. Reaching this group is unlikely to be attractive to most vendors, in that the distribution economics involve a higher overhead than is the case with campus outlets, but it represents less of a problem for the educational publishers, who are already typically selling through these channels for print-based materials.

To date, the only micro vendor that has experimented with captive outlets for campus concentrations is Commodore, which has established its 250+ Educational Resource Centers to serve both major school districts and major colleges. Commodore, however, is trying exceptionally hard to penetrate the educational institutions market (and in particular to establish credibility in this area), and the other vendors do not appear to be following suit, preferring combinations of direct marketing for bulk lots and local retail outlets. This pattern will also probably be the norm for the rest of the decade, with the campus market being supplied by two main groups:

1)The educational publishers, distributing via the same channels as for print-based materials (i.e. bookstores, central ordering) and focusing on courseware packages and other education-related products.

2)Software distributors. This group, described in Section 9, acts as middleman between vendors and retailers, and is likely to be the main channel for general types of packages going to on-campus retail outlets. These are typically locally-owned (often by the institution's authorities

or student organizations) and as such too fragmented a market for most vendors to sell to directly.

In the long term, as micro use in colleges grows, specialized distributors emphasizing educational lines are likely to be a factor in the college market as they are starting to be in the school field -- this development, however, seems unlikely to occur on any scale until towards the end of the decade.

Market Outlook: Although a slower starter than the school market, the college market shows more promise. While centrally coordinated use of micro hardware/software does not appear likely on any scale over the next five years, growing micro usage by college students suggests that there will be a useful market for packages that students will buy and use themselves to support their studies. Simulation and modelling products for the numerically-oriented sciences and business-related packages are prime candidates. In addition, college demand for general business, scientific and engineering and programming packages is likely to be healthy over the forecast period, and it is surprising that this sector has received so little attention at a time when the cash-starved school system has been targeted by so many aspiring vendors. Exhibit 4-5 shows the ten-year forecasts for the college software market.

Exhibit 4-5

1983-93 Market Forecast: Colleges

Specialized Packages

	1983	1984	1985	1986	1987	1988	1990	1993
Units (000)	4	7	12	20	36	78	135	200
Avg. Price ($)	125	125	125	130	135	140	130	125
$Millions	0.5	0.9	1.5	2.6	5	11	18	25

Non-specialized Packages

	1983	1984	1985	1986	1987	1988	1990	1993
$Millions	5	9	15	21	27	35	65	100

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SECTION 5   GAMES

Worth $540 million in 1983, the games market constitutes the second largest segment of the micro software market in dollar volume, but by far the largest in unit terms, with more than 18 million packages likely to be shipped during the year.   More than any other type of package, games sell to all types of user (with the apparent exception of those using micros in business environments only, principally in large companies), and it is notable that even Osborne Computer has felt the need to introduce games products for its portable, and it seems that even the "straightest" of business users play games on their machines.

While a handful of games such as Dungeons and Dragons trace their ancestry back to the entertainment activities of host programmers, the bulk of micro games have orginated as arcade or video games or have been converted to software from other games formats (e.g., board games, quizzes).   Consequently their market behavior differs from that of most micro packages, resembling other types of consumer entertainment products rather than other types of micro software packages.

The Marketing Environment for Games

Games packages are typically fast-turnover items with short product life cycles.   While a few packages, notably the more sophisticated adventure games which require role-playing and a fair amount of fantasy, and "hit" arcade-type games have succeeded in remaining in best-seller lists for long periods of time, the vast majority of games titles enjoy no more than a three to six month life cycle (assuming that they "take" in the market at all -- a large number are dead in less than three months).

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Price's in general, are fairly comparable and consistent regardless
of type of system or game -- around $30 is the average price for all
categories except strategy and educational games for high-end micros,
which average around $37-$38, and for all systems except the TS-1000,
whose packages run typically in the $12-$35 bracket and average around
$25. There seems to be firm consumer resistance to paying much above
that level -- even a sophisticated role-playing adventure game like
Wizardry, which enjoys a dedicated "cult" following, is around $50 from
most outlets, and few dare to go above that level. See Exhibit 5-1 for
game pricing levels.

<div align="center">

Exhibit 5-1

Pricing of Games Packages

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Type of Game	High-End Micros		Low-End Micros	
	(Typical Range)	(Avg.)	(Typical Range)	(Avg.)
Adventure games	$20-$70	$29.4	$20-$50	$29.0
Arcade Games	$20-$70	$33.0	$16-$30	$31.9
Educational Games	$20-$75	$37.5	$20-$45	$27.5
Sports Games	$25-$40	$29.8	$16-$40	$29.6
Strategy Games	$20-$70	$37.6	$16-$40	$28.8
All Types		$30.1		$29.2

(TS-100: Typical range and average for all types is $12-$35 and $25
respectively).

Based on sample of 600 leading games packages, May 1983.

As mentioned previously, product life cycles are also typically
short. While a handful of games (e.g., Broderbund's Choplifter, Muse
Software's Castle Wolfenstein, Sir-Tech's Wizardry and Infocom's Zork)
have managed to keep themselves on best-seller lists for long periods
of time -- over 12 months during the 1982-1983 period in the case of
the above four -- most game titles have a much shorter life and find
themselves in retirement before they know it. For example, the games
products in the "Software Merchandising" best-seller list in May 1983
had been on the list for an average of only 5.2 months. Moreover, this
figure was inflated by four products which had been on the list for
more than 10 months, and if these were factored out, the remaining 16
averaged only 3.4 months. While a small number of products succeed in
establishing themselves as "hit" sellers, turnover in the best-seller
lists is otherwise high.

These factors combine to make the games market a volatile and risky
business, obliging vendors to keep up a steady pattern of product
introductions, and to pay particular attention to marketing and distri-
bution actions to remain competitive.

As discussed in Section 2, 1983 is seeing the first serious erosion
of the market for video games machines by low-end micros, and over the
next five years low-end micro hardware products such as the Atari 400/800,
Commodore VIC-20, TI 99/4A, Timex-Sinclair 1000 and their successors can
be expected to phase out the games machine unit market entirely -- the
implications of this for the games market can be seen by considering the
scale of video games hardware/software shipments -- in 1982 more than

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eight million games machines and 50 million ROM cartridges were shipped, with 1983 levels likely to exceed 14 million and 80 million respectively.

In this section video games hardware/software has not been included in market figures and forecasts, although ROM cartridge products for low-end micros have been so included.

Types of Games

Games packages can be divided into four main types: arcade, adventure, strategy and sports. In addition, there are several smaller categories of games that emerged that do not fit into this classification, notably word and detective games.

Arcade Games: The home arcade games segment can be segmented into two categories of game-playing activity: single-player and competitive. The distinction refers not so much to the number of players (most single-player games provide "Player 1, Player 2" etc. score displays, and players can alternate) as to whether the player is competing against the machine or against another player. Typical examples would be the pinball machine (single-player) and the table football set (competitive).

It is one of the more striking aspects of the games scene that single-player games have far outstripped competitive types in popularity. While most of the electronic products provide for multiple players, the usage seems to be predominantly single-player, and the format derived from the pinball type of game: the player must keep an object in play while racking up a score. The essential difference is that the ball has been replaced by a graphic motif, and that keeping it in play has come to involve more complicated maneuvers than hitting the right spot on the board and stopping the ball from disappearing down a hole.

The shift to electronics has also resulted in a change in the way that game themes are presented -- whereas previously these could only be painted on the hardware, they can now be incorporated into the screen graphics.

The two main formats that have become popular in arcade games are generally referred to as "shoot-'em-up" and "maze chases," although the two have increasingly been combined. These formats can best be illustrated by some examples, drawn from games in the industry best-seller lists. In these, the player must:

a) "maneuver the frog over a variety of obstacles -- including a busy highway (and) help him catch flies" (Sierra On-Line's Frogger).

b) "rescue four groups of hostages in a foreign land (while avoiding) tanks, jet fighters, and air mines" (Broderbund's Choplifter).

c) "cross a golf course filled with lawn mowers to retrieve a golf ball" (Adventure International's Preppie).

d) "climb out of the Grand Canyon on a burro (while avoiding) rocks and sweeping birds" (Datasoft's Canyon Climber).

e) "gobble up as many gumdrops as possible, over three different mazes (while avoiding) gumdrop guards and (dealing with) special doorways, magic starts and pop-up desserts" (Datamost's Snack Attack).

As these examples suggest, the basic format can be boiled down to "the player must....while avoiding...." with some games also offering various opportunities during the game for the player's motif to gain additional points or advantage.

Most arcade games are essentially variations of this theme -- the player controls a graphic motif which must be kept on the screen and/or gotten to a certain point while racking up a score and avoiding obliteration.

<u>Adventure Games</u>: Adventure games are more complex than the arcade games discussed in the last section, and their progenitor is generally believed to be the "Dungeons and Dragons" board game. If arcade games draw their inspiration from amusement arcade machines, adventure games draw theirs from the mass of fiction that has developed around mythical themes and usually involve bold heroes, fair maidens, dragons, ogres, wizards, swords, chalices, magic forest and various other supernatural manifestations.

In contrast to arcade games, adventure games typically involve text, with players dialoguing with the machine on the subject of the moment. In addition, they usually incorporate a variety of scenarios, with the actions of the player determining which becomes operative, and the player will be confronted with a series of problems -- these have ranged in complexity from "which door do I take?" to "what spell should I cast to defeat the evil wizard?" The cruder games involve sets of relatively simple goals and problems not far removed from arcade games (e.g., find the magic sword while avoiding trolls), but more complex ones (which may run to several discs, and whose software rivals the best business or educational simulation and modeling packages) typically involve elements of role creation and/or role-playing.

Two examples can be used to illustrate this range:

a) "Players wander through a four-level dungeon, building character strength in an attempt to gather all twenty treasures....A local innkeeper sells them weapons, armor and healing salves." (Automated Simulations' Temple of Apshai).

b) "Players can choose from five races and eight professions to create up to six characters, each with their own strengths and weaknesses. These characters explore a dungeon, fighting groups of monsters, casting spells, finding treasures and magic items, and amazing clues to solve the puzzle presented in each scenario" (Sir-Tech's Wizardry).

Strategy Games: Strategy games are a third category of computer games and are largely derived from the more complicated board games. They include software equivalents of popular games such as chess, checkers, backgammon and the like, as well as board games using text prompts (e.g., Monopoly) and war games (ranging from simple versions of "battleships" to more complex games requiring players to fight campaigns, outwit the enemy, etc.).

The range of complexity in this field is large, and products cover the ground from "noughts and crosses" to games such as Atari's Eastern Front, in which the player invades Russia circa 1941, and which takes upwards of two and a half hours to play.

Sports Games: The fourth category of computer games is sports games, which typically involve an arcade-type format, but aim to reproduce actions according to the rules of popular games (e.g., baseball, football). Initially successful in video games, sports games have made the transition

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to low-end micros -- while they seldom make the best-seller charts, the better products remain steady sellers longer than other types.

<u>Other Games</u>:   Just about everything that has ever made it as a board game, quiz or game booklet has been converted into a package by someone or other by now.   Among the more notable types are the following games:

<u>Detective Games</u>, like advanture games, use a text format and incorporate scenarios and some degree of role-playing. They borrow heavily from traditional "Whodunit" themes, with the player typically having to piece together clues and deduce which of the personalities presented committed the crime and/or how it was done (in the style of "Lady Agatha says she spent the day in the conservatory, but Sir Joshua says he saw her in the garden at 4 p.m.").   Although a small part of the market, this genre seems to enjoy a dedicated following.

<u>Word Games</u> derived from board games such as "Scrabble," spelling games and games in the style of "What is the capital of Sri Lanka?" They use a text format and are usually relatively simple to operate.

With the exception of sports, word and some strategy games, which borrow from easily-recognizable game formats, most games have to offer some kind of "action pattern" which holds the player's attention. In arcade games this typically involves a fast chain of screen occurrence and player response, while text-based games must provide a sufficiently interesting sequence of scenarios and problems.

<u>Product Differentiation</u>

The profusion of games packages and the limited range of permuta- tions available inevitably pose product differentiation problems -- one

zapped alien is, after all, very much like another zapped alien, and even wizards grow predictable after a while. The games vendor is thus faced with the problem of "inventing a better mousetrap" on a regular basis, and convincing the consumer to buy his product rather than one of the 1,000+ similarly-priced packages with similar themes and formats.

The games package, in short, has become just another consumer product, and the marketing approaches that are being adopted are those traditionally used by vendors of such products as board games, toys, gadgets and paperback books.

Varying the Theme: As Exhibit 5-2 shows, the search for game themes that will be "new and different" to the consumer has led vendors to box the compass (the exhibit is based on a sample of games packages introduced between December 1982 and May 1983). Among the things they have come up with are:

A.   Movie and TV Show Formats: The list of games derived from popular movies and TV shows is large and growing. Among the more notable that have been converted to software are Star Wars, E.T., Raiders of the Lost Ark, Tron, Star Trek, The Black Hole, The Dark Crystal, Alien, Dallas, M*A*S*H, The Dukes of Hazzard and a variety of themes from educational TV shows. In addition to games derived directly from these formats, there are frequent "spin-offs" -- Raiders of the Lost Ark, for example, produced a spate of games revolving around gold masks, fierce natives, divine powers, etc.

B.   Topical Themes: Arcade games have been inspired by (amongst other things) Three-Mile Island, terrorism, the MX missile system, ecology, energy conservation, dolphins and the Iranian Hostage Crisis.

EXHIBIT 5-2   RECENT GAMES "HIT" THEMES

	Arcade	Adventure	Strategy	Sports
Space/Sci-Fi	35	3		1
Movie/TV Themes	14	1		
Crime/Spies	5	1		
Western	3			
Horror	4			
Mythological	4	6		
World War II	2		2	
World War III/ Nuclear Holocaust	4		1	
Topical Themes	7		1	2
Humor	4			
Sex	1		1	
Miscellaneous	5		6(1)	3(2)
	88	11	11	6

1) Includes games derived from chess, poker(2), business, cribbage and bridge

2) Includes games derived from darts, football and marbles

Based on Sample of 117 games with above average retail sales introduced between December 1982 and May 1983

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C. Traditional Entertainment Themes: The search for new game themes
has led vendors not merely into the space and science fiction world but
into many older formats that have been common in movies, TV shows and/or
popular fiction -- notable examples are World War Two, cops-and-robbers,
private eyes, boy heroes of various sorts, westerns and slapstick comedy
(including at least one package that goes back to the Keystone Cops for
its inspiration). This vein is obviously far from exhausted.

D. Theme Combinations: Notable recent examples include private eyes
from outer space, football in outer space, arcade and word games
(Davidson and Associates' Word Attack!) and adventure games and outer
space.

E. Humor: Obeying the old injunction to "make 'em laugh," vendors have
also introduced products that feature humorous themes and/or graphics.
Recent examples include unlikely creatures (e.g., "Twerps," carnivorous
tomatoes, humanized rats) and such imaginative games as Trashman ("The
player is spearhead of the city's anti-litter campaign...your attempts
to clean up the town are, however, thwarted by enormous flies"), Tax Dodge
("the tax bite approaches from all angles, but you do have some help from
deductions, tax havens, accountants and lawyers..But beware of audits!)
and Preppie ("The preppie in question, Wadsworth Overcash, must cross a
golf course filled with lawn mowers to retrieve a golf ball.").

F. Sex: This was inevitable, and if the video cassette market is any-
thing to judge by, this is clearly going to be a growth area. Recent
examples include Strip Poker, whose advertising stresses its high-
resolution color graphics, and Custer's Revenge, whose controversial
"rape scene" obliged it to be withdrawn from the market. With the

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imminent entry of Playboy Publications in this market, anything is possible. Most of the larger software publishers are likely to steer clear of sex themes -- smaller firms are less likely to do so.

Merchandising: With prospective buyers likely to be confronting racks of games products from dozens of different vendors, vendors have inevitably resorted to a variety of consumer marketing tactics, which include the following:

A. Advertising: Atari took an early lead in this area, with its TV ads slating competitor Mattel's video games units, and has continued to spend heavily with radio, TV and print advertising focused on new game introductions. Other vendors, notably the manufacturers of low-end micros and the entertainment conglomerates such as CBS, MCA, Thorn-EMI and Fox, have followed suit or plan to do so. This trend is inevitably acting in favor of the larger groups with the resources to handle this kind of outlay, and retailers are sensitive to the effects of mass-advertising in their stocking and display decisions.

Smaller vendors have, however, also used advertising effectively. Vendors of games with relatively small but dedicated followings (e.g., adventure, strategy, sports and detective games) have used advertising in special-interest periodicals. A small vendor of educational games, Spinnaker Software, has set what will probably become a trend by taking space in consumer periodicals for advertisements targeted at parents whose children spend large amounts of time playing video games (and inviting them to join the "Mothers Against Monsters Movement" -- the monsters in question being those featured in many popular games).

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B. <u>Point of Sale Displays</u>: Modeled on the point of sale (POS) displays common in bookstores and record shops, single-vendor games displays have also begun to appear, complete with graphics, demonstration sets, posters and brochures.

C. <u>Packaging</u>: This has long been a weak spot in games marketing, and it is only over the last year or so that a significant improvement has been noticeable. Many of the product packages now appearing have high-quality professional illustrations, particularly those for space and adventure games. Most of the retailers interviewed for this study indicated that while packaging may not in itself sell a product, it is effective in enticing customers to examine it more closely and to read the description of the game. This, with retailers' displays often containing 50-100 products, is a far from negligible asset.

<u>Technical Differentiation</u>: Attempts by suppliers at differentiating the game software by technical quality have tended to involve graphics, sound effects or both of these.

A. <u>Graphics</u>: The most imaginative applications of screen graphics have involved the use of vectors (first introduced in the late 1970s on arcade machines) to create 3-D effects. Unsurprisingly, they have most commonly been used on space theme games, and have drawn heavily from graphic effects pioneered in science fiction movies -- Luke Skywalker's flight down the Death Star's polar trench in "Star Wars," the movie "The Black Hole" and the graphics used in "Tron" have all been reflected in games.

In general, however, computer games graphics have lagged behind the kind of computer animation used in these films. This situation is likely

to change with the market entry of the entertainment conglomerates,
film producers such as Lucasfilm and specialist computer animation
firms. The next major development is likely to be the combination of
vector graphics with raster (i.e., conventional "2-D" CRT) graphics,
which a number of firms are working on. Introductions are likely during
1984. In the longer-term, as discussed later in this report, combined
video/data, high-resolution CRT and videodisc technologies will also
have a major impact.

8. Sound Effects: Whether using speech synthesis modules or audio
cassettes, these are not a new phenomenon -- products using this approach
have been around since the late 1970s, and TI in particular has stressed
speech synthesis for educational games. To date, however, the effects
have tended to be crude (single words, short statements, roars, bangs,
screams etc.). This is clearly going to change with the progress of
speech synthesis technology, and in the meantime vendors have also begun
using "voice over" as selling points. Recent examples have included:

a) Poker Sam (Computer Software), a poker-playing game that also
   provides a "wisecracking gamester. He narrates each hand, names the
   cards, announces the bets and keeps you entertained."

b) Clipper (Program Design), a game that requires the player to
   navigate a clipper from New York to San Francisco circa 1850 while
   surmounting a variety of obstacles. According to the vendor, "the
   company promises dazzling graphics and sound effects. Included is
   a voice cassette with informative narration and sea chanteys sung
   by sailors."

While neither of these products have made it into best-seller lists, the trend is clearly an important one -- leading-edge games are increasingly turning into "entertainment" packages, and competitive pressures among games suppliers could have the effect of forcing mergers of micro, audio and video technologies faster than is generally anticipated.

Vendors

Suppliers of games packages come in all shapes and sizes, ranging from micro vendors and "serious" software houses like Microsoft (which markets a handful of sophisticated sports and strategy games) to the inevitable "garage shops." Exhibit 5-3 shows leading firms in this market. In general, games vendors can be divided into four groups:

Micro Vendors: With the exception of Atari, which had developed this area for its video games business, the hardware vendors have not been a major force in this market, and have developed a few programs in-house. Short product life cycles and off-beat topics have not been something they feel comfortable with, and corporate environments do not seem conducive to the kind of atmosphere in which "hit" games are developed.

Games Specialists: This group has generally been the most successful, and has usually succeeded in combining good products with strong marketing and distribution skills. Only one of the leading companies, Avalon-Hill, has diversified from another field (board games). The remainder have games software as their only or principal business: Adventure International, Broderbund, Sierra On-Line (formerly On-Line Systems) and Sirius Software are in the first rank, and other notable firms include Acorn, Automated Simulations, Datamost, Datasoft, Infocom, Instant Softtape, Strategic Simulations, Synapse, Synergistic Software and United Microwave.

EXHIBIT 5-3   LEADING GAMES VENDORS

Vendor	No./Type of Games		Hosts
Adventure International	60	Adventure	Apple, TRS-80, Atari, CP/M
Atari	100	All types	Atari
Avalon-Hill	150	All types	Apple, TRS-80, IBM, Atari, VIC-20, Commodore PET/CBM, Commodore 64, TI
Broderbund	50	Arcade, Adventure	Apple, IBM, Atari, VIC-20, Commodore 64
CBS Software	12	Arcade	Atari, VIC-20
Datamost	40	Arcade, Sports, Strategy	Apple, IBM, Atari, Commodore 64
Epyx/Automated Simulations	40	Arcade, Adventure	Apple, TRS-80, IBM, Atari, VIC-20, TI, Commodore 64
Infocom	12	Adventure	Apple, TRS-80, IBM, DEC, Atari, Commodore 64, CP/M
Micro Lab	15	Arcade, Adventure	Atari
Roklan	25	Arcade, Strategy	Atari
Sierra On-Line	60	All types	Apple, IBM, Atari
Sirius Software	50	Arcade, Adventure, Sports	Apple, IBM, Atari, VIC-20
Sir-Tech	25	Adventure	Apple, IBM
Softape	20	Strategy, Sports, Word	Apple
Strategic Simulations	35	Strategy	Apple, TRS-80, IBM
Synapse Software	55	Arcade, Detective	Atari, IBM
Synergistic Software	25	Arcade, Adventure	Apple, IBM
Texas Instruments	50	All types	TI
Thorn-EMI	23 ·	Arcade, Strategy, Sports	Atari, VIC-20
United Microware	40	Arcade, Strategy, Word	VIC-20

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At the lower-end of the spectrum are the usual "garage shops," as numerous as in other areas of the package market and with an even higher death rate, although smaller outfits will occasionally break through into a steady and well-distributed existence -- many of the firms listed above started in this way.

Diversified Software Houses: A handful of vendors have combined games with business, utility and/or educational lines, typically taking advantage of an established distribution presence to add new titles across the board. Notable examples include Continental Software, Hayden Software (a subsidiary of the Hayden Publishing group), Micro Lab and Muse Software.

Entertainment Companies: The appearance in the games market earlier this year of Thorn-EMI with a range of 21 games for the Atari 400/800 and VIC-20 and of CBS with its "Fastware" line of four ROM cartridge units for the Atari 400/800 are clearly the tip of the iceberg. Although neither company has yet made much of an impact on the market, they are indicative of a larger trend which will create major changes in the games market over the forecast period, and which is discussed in the following section.

Games into Entertainment

Over the last few years, the explosive growth of the video games market has brought most of the major entertainment conglomerates into the market either as cartridge suppliers and/or via agreement with video games vendors for licensing of popular movie, TV show and even music themes. Warner Brothers (Atari's parent company), CBS, MCA, RCA,

Columbia and Twentieth Century-Fox in the U.S.A. and the British-based Thorn-EMI group all possess diversified interests in entertainment fields, typically covering films, TV, video programming and records and tapes, and all have entered or are due to enter the games area. To date only Thorn-EMI and CBS have targeted the low-end micro market with Warner Brothers, via Atari, already a force here. In the long-term however, the collapse of the low-end into one primarily for game-playing is going to bring all of these into the games software market in a big way.

The current video games market is probably a fairly good indication of what the micro games market is going to look like by 1986, with a mass-market not merely in terms of volume but of the kind of marketing strategies that will be necessary. The kind of advertising and merchandising expenditures and skills put out by companies like Atari, Mattel, Coleco, North American Philips (Odyssey 2) and the entertainment conglomerates in the video games market makes the leading companies in micro games packages look strictly like little league outfits -- few if any have the kind of resources to handle even limited mass-marketing campaigns.

The result will be concentration -- video games best-seller lists, for example, have traditionally been dominated by a handful of companies, while those for micro games have shown a much wider spread·of vendors. While this is not an immediate threat for micro games vendors, it will clearly need watching -- the greater the micro package market, the more principles of economy of scale of marketing, advertising and distribution will come into play.

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Educational Games

   As discussed in the previous section, many types of packages
designed for the educational institutions market have begun to "spill
over" into the consumer market, notably those intended to teach basic
literacy and/or numeracy skills and those designed to develop more
generalized skills such as logical reasoning. This area shows signs of
developing into a "gold rush," based on the following line of reasoning:
1) Given the present growth rate of low-end micros in the consumer
market, and the anticipated collapse of low-end micros into the games
unit market, large numbers of children will come to have access to a
piece of intelligent hardware in the home. At a conservative estimate,
by 1985 some 20 million children in the 3-13 years age bracket will
have access to some form of games machine, of which 7-8 million will
have access to a low-end micro.
2) Educational games will be made sufficiently "fun" to compete with
conventional games packages for the attention of children. They will
also be price-competitive.
3) Aware of this, parents will figure that if their offspring are
going to spend much of their time playing screen games, they might as
well get some educational benefit out of it (a variation of TI's
campaign on the lines of "Why buy a video games machine when you can
get a real computer for the same price?").

   The argument is substantially accurate, although somewhat oversold
by its proponents -- educational games are likely to be purchased
initially by those sections of the population who take an interest in

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educating their children at home, typically higher-income, more educated groups. Moreover, educational games have so far shown no sign of responding to the kind of themes that have evoked strong responses in conventional games e.g., space and science fiction themes, and a few of them provide the same kind of thrill that is provided by zapping aliens while avoiding one's own obliteration.

Nevertheless, the market is an attractive one -- there are clearly a large number of solicitous parents around, as sales of educational toys and board games, encyclopedias and the like indicate.

Vendors: The vendors of educational games have come from two directions: educational software developers, typically specializing in packages for younger age groups, who have moved into the consumer market, and firms already in this market who have recognized the potential for offering educational lines.

A. Educational Software Developers: Although just about everyone who is in the business of developing educational software for younger classes and preschoolers has targeted the consumer market, not all of the companies have made the transition successfully -- marketing has come hard to some, and they have been slow to grasp the importance of techniques necessary in the retail market (e.g., packaging, advertising, courting retailers and distributors). The situation parallels that in conventional games in that only one of the more successful vendors from this background has diversified from another field (Milliken Publishing, discussed in the previous chapter). The remainder have all started life as specialists, and all combine skills in education,

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software development and marketing in relatively small organizations. Among the leaders:

Edu-Ware, with more than 30 packages, covers spelling and numeracy and more general "reasoning" games. Although not a high-profile company, its products are steady sellers and it has a well-established distribution network.

Reston Publishing markets only a few titles, notably Paint, whose attractive color graphics have attracted considerable attention.

Spinnaker Software. Described in the previous chapter, Spinnaker has demonstrated an exceptional flair for both product development and merchandising. The company had an early hit with its Snooper Troops, a whodunit? game that started to make the best-seller lists late last year, and which has since expanded to seven titles. The company's products are attractively packaged and its advertising has also been above the norm.

Sterling Swift Publishing. An Austin, Texas-based specialist, Sterling Swift markets more than twenty packages targeted at ages from seven years up. In contrast to most companies, the firm works mainly with outside authors with educational track records.

The Learning Company. Set up by an Education Ph.D., The Learning Company (TLC) has rapidly established a record as a developer of products much-appreciated (and much-endorsed) by teachers. The company markets seven packages aimed at encouraging "logical thinking, reasoning and problem-solving."

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Optimum Resource. Described in the previous section, Optimum Resource
clearly has a winner with its Sticky Bear series, whose graphics have
succeeded in catching much of the flavor of popular cartoons, and which
is supplemented by attractive print materials. Marketing of the firm's
four lines is by Xerox Education Publications.

B. Consumer Marketers: Although it is somewhat of an unknown enity
to them, the educational games market has proved particularly attractive
to the vendors of low-end micros. While most of them do not feel
comfortable trying to "call the shots" in conventional games (Atari, as
discussed earlier, is an exception), educational products project a
more serious image -- and as TI has been stressing in its advertising,
are useful in persuading people to buy a micro rather than a video
games unit. This has posed problems for Atari, which continues to have
large-scale interests in games units, and the company has tried to head
off the trend by offering programs for its games units, notably a
series co-developed with the Children's Television Workshop.

To date, none of the micro or games unit vendors has succeeded in
matching the flair of the independent developers, and most of them are
working with these companies and/or educational institutions to build
up their product lines. (Commodore, for example, has set up a special
program with the Kindercare chain, a private day care center organiza-
tion, to test and develop programs for preschoolers.)

Coming from the video game market, Milton-Bradley, a long-
established vendor of educational toys and games (and more recently of
educational video game packages) has also moved into the micro market

with a series of "fun" packages for the Apple II teaching basic literacy and numeracy skills.

In addition, games software companies have begun to add educational titles to their lines -- educational games from Broderbund, Advanced Operating Systems (AOS), Instant Software, Sirius Software and Synergistic Software have begun to appear on retailers' shelves.

User-Created Games

Over the last year, a number of products have also begun to appear in the games market that allow the player to create his or her own games formats. The most visible of these has been Broderbund's The Arcade Machine, a cross between an arcade game and a graphics generator which permits the player to assemble sets of graphic images and establish game rules -- it includes a tutorial program which takes the user through the process of game creation using the example of a "shoot-'em-up" arcade game. Other products that have appeared include Atari's The Entertainer Kit, a similar package for the 400/800.

At present, this type of package is only a small part of the market, and the complexity of game creation is enough to deter all but the most computer literate and dedicated games player. However, with the appearance of LISA-type operating systems on both high- and low-end micros on a large-scale likely over the 1983-1986 timeframe, we anticipate that this type of package will become increasingly popular over the forecast period covered by this study.

Winners and Losers

Of all sectors of the micro package market, games -- whether for recreation or educational -- are the least amenable to "recipes for

success" and even products that have been tied to popular themes, heavily advertised and backed by the resources of the largest vendors have been known to "bomb." Conversely, games have moved into best-seller lists from unlikely sources (Donkey Kong, for example, began life in Japanese amusement arcades).

While marketing resources can turn a good product into a best-seller, in the final analysis there is no substitute for product quality and particularly for a good "storyline" combining an attractive action pattern with appealing graphic images. There is clearly no way to guarantee this -- the successful companies have been those that have started with winning "concepts" which only the right kind of creative individual seems able to come up with. Vendors who do not feel comfortable with this kind of environment are advised to say clear of the games market, or to work with games specialist companies with a proven track record of success.

Market Outlook

The 1983 shipments of games packages for all types of micro are likely to exceed 18 million units in 1983, equivalent to $540 million at retail pricing -- this averages out at between two and three purchases per micro installed by year-end 1983, and it is clear that it represents a major increase on the 1982 level, largely as a result of the success of low-end micros (installed based by year-end 1983 is likely to be well over five million units). Exhibit 5-4 shows the ten-year forecasts for the market.

EXHIBIT 5-4 1983-93 MARKET FORECAST: GAMES

Units (Millions)	1983	1984	1985	1986	1987	1988	1990	1993
Recreational	17.5	32	48	56	76	98	115	125
Educational	0.5	1	2	5	10	13	16	15
User-created	-	-	1	3	5	9	15	20
	18.0	33	51	64	91	120	146	160
Video/Software Games	-	-	-	-	2	5	16	35

Average Pricing ($)	1983	1984	1985	1986	1987	1988	1990	1993
Recreational	30	30	30	28	25	20	20	20
Educational	33	35	35	32	30	30	30	30
User-created	-	-	45	40	35	30	30	30
Video/Software Games	-	-	-	-	60	60	50	50

$ Millions	1983	1984	1985	1986	1987	1988	1990	1993
Recreational	525	960	1440	1570	1900	1960	2300	2500
Educational	15	35	70	160	300	390	480	450
User-created	-	-	45	120	175	270	450	600
	540	995	1555	1850	2375	2620	3230	3550
Video/Software Games	-	-	-	-	120	300	800	1750
Total (all types)	540	995	1555	1850	2495	2920	4030	5300

The key issue in projecting the micro games market is the extent to which these models will replace the video games machine market, and whether their users will come to adopt the purchasing patterns of games machine users, which typically run in the five to ten units a year range. We anticipate that the answers to these will be that a) low-end micro sales will have effectively phased out the market for new games machine sales by the end of 1986 and b) low-end micro user games purchases will not account for the same unit volume, for two reasons:

1) Much of the growth in games machine cartridges has been accounted for by new users -- once they settle down to regular buying patterns, the indications are that unit purchases slow down.

2) Many of the households currently buying low-end micros already have games machines, and while trade-ins will probably take out much of the installed base of these, it is not going to be an overnight phenomenon. Moreover, the leading games machine vendor, Atari, will doubtless preserve cartridge portability if it decides to allow its low-end micro competitors and phase out its own games machine installed base.

For these reasons, we anticipate that units per micro will remain in the two to three range per year level until after 1986, when replacement of users' existing games bases begins to gather momentum, and when the activities of the entertainment mass-marketers are fully oriented towards micro software, and heavy advertising and merchandising activities will be helping to accelerate volume.

The following assumptions were also made:

- Pricing remaining stable around the $30 level until the 1985-1986 timeframe, with vendors preoccupied with meeting demand rather

than taking market share off each other. After this time, how-
ever, we anticipate strong competitive pressures on pricing as
the various price-slashing tactics that have been applied to
low-end micro hardware are transferred to software products as
the hardware market stabilizes. A major factor in this will
probably be the entertainment companies, which are more likely
to initiate and better able to sustain mass-marketing drives
than most current games vendors.

- During the second half of the forecast period, a merger of soft-
  ware and video disc-based products, resulting in a higher
  average product price than would otherwise have been the case --
  we anticipate this starting to become a major factor towards the
  end of the decade, and relaunching the entire games market during
  the last three years of the forecast period.

- Most current types of games will remain throughout the forecast
  period, but with educational games starting to pick up momentum
  in the 1984-1985 timeframe, and user-created games becoming more
  of a factor in the market from 1986 onwards, with the penetration
  of LISA-type operating systems into the low-end micro field and
  improvements in product quality as this type of package becomes
  popular.

- Over the whole period, a trend towards longer-playing games and
  packages combining several games, also resulting in downward
  pressure on unit shipments and dollar volume levels.

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SECTION 6   MISCELLANEOUS PERSONAL SOFTWARE

The widespread penetration of micros into homes has inevitably
raised questions as to what kinds of new applications are likely to
emerge for the home. The suggestions include such things as "house
control", with the micro performing energy management and the like and
"home networks", with various intelligent devices and household appli-
ances communicating with each other. Many of these should be taken with
a large pinch of salt -- one can buy considerably cheaper devices for
this kind of thing, and anyway, where is all the wire going to go?

This type of suggestion is typical of a fundamental misconception
about the home market -- we are dealing with a technological revolution
of sorts, but it is a revolution in the medium of home activities, not
in their content. People are starting to use micros for the same kind
of activities they did previously via a different medium (e.g. read a
book, work it out on a notepad, play board games, watch TV).

One should also be careful about how the "home market" is defined --
while the vast majority of micros under $1,000 are clearly used for non-
business applications in the home, it is clear that many of the more
powerful and expensive micros to be found in the home are in fact used
for business applications by small business principals, professionals,
the self-employed and employees of larger organizations, a trend to
which the rapid development of the portable market is contributing.

A primary distinction is thus between packages for low-end micros,
which may constitute part of the rationale for purchase, and high-end
micro packages, which are aftermarket sales to people who use a micro

primarily for business-related activities or for programming. With
these reservations, the following categories of product are emerging:

Home and Personal Finances/Management

This type of package typically provides simplified accounting
procedures and/or DBMS capabilities for a variety of "personal filing"
uses. The success story in this area has been Continental Software's
Home Accountant, which has been on best-seller lists since its intro-
duction earlier this year. At $75 for the Apple II, IBM PC and Atari
400/800, it includes such functions as checkbook balancing, printing
of checks, budget planning, a personal general ledger and a net
worth statement -- obviously used by those with some previous exposure
to accounting or finance. In addition, Atari, Tandy and TI have in-
troduced packages for such applications as family or personal accounting
and record-keeping, while Eagle Software offers a more sophisticated
$200 package, Money Decisions, for the Apple II, IBM PC and TRS-80.

There are over 20 such products currently available, usually
priced in the $25-100 bracket, and the number is increasing rapidly.

Income Tax and Investment Management

A variety of packages for these applications have been selling
to non-business users as well as to those (e.g. accountants, stock-
brokers) with professional requirements for this type of package.
Notable examples have been a series of packages marketed by Howard
Software under the rubric Tax Preparer and customized for the parti-
cular requirements of individual state taxation systems ($75), and the
company also markets packages for federal income tax preparation which
can be updated annually to take account of changes in taxation laws

and procedures by arrangement with the company. On the investment management side, the most popular package has been Dow Jones' Market Analyzer, a $250 package for high-end micros, although there are more than a dozen such packages available in the $150-250 range.

Continuing Education

This category is distinct from educational games in that users are predominantly adults for whom a "fun" content is not required. This market is as yet little-developed, although some educational packages for drill and practice for mathematics, foreign languages and the like are starting to find their way to individual adult purchasers via retail outlets. In the long term, however, this is likely to be a growth market, with expanding micro bases in homes and with micro vendors likely to realize the potential of this and applications such as home finance and management as selling points for hardware.

"Paintbox" and Musical Packages

Difficult to categorize, there are also over a hundred packages on the market which allow users to create various color graphic images ("paintbox") and which combine screen musical notations with tonal effects via speech synthesizer or cassette (notable examples are Data-Soft's Micropainter at $40 for the Apple II and Atari's Music Composer at the same price for the 400/800). While still an insignificant part of the package market, this type of application is also likely to see major growth over the forecast period with the introduction of LISA-type operating systems on low-end micros and the merger of micros with other types of consumer electronics hardware over the 1988-93 timeframe.

Market Outlook

While this is clearly going to be a growth area over the forecast period, it is unlikely to come near the games market in unit or dollar terms for several reasons:

1) Most of the packages sold to date in these categories have been for high-end micros, and the indications are that packages for systems such as the Atari 400/800, TI 99/4A and Commodore VIC-20 are selling less well despite the larger shipment levels and installed bases of the latter. This is primarily a function of user profiles -- the high-end micro users tend to be more educated and familiar with computers, with the result that they are prepared to use micros for these types of application than the typical low-end micro user. Thus while growth in the games market is likely to parallel the growth of the low-end micro installed base, this is less likely to be the case for more sophisticated types of personal software.

2) Unlike games, these applications packages are unlikely to be purchased on a repeat basis, nor is it likely that there will be much of a replacement market over the forecast period.

Consequently, personal software for such applications as home and personal finances/management, income tax and investment management, continuing education and "paintbox" and music is likely to remain a relatively minor component of the consumer software market, although -- as discussed below -- it is likely to have a significance out of proportion to its actual market value.

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Personal Software as Micro Selling Point: At a time when the market for low-end micros (as a result of the huge price cuts) is beginning to erode that for video games machines, and all of the major low-end micro vendors except Atari have deliberately sought to offer their products as a superior alternative to the latter, non-games personal software is likely to prove a useful selling point for these systems. While educational applications for younger children will probably play a more important role overall, the ability of low-end micros to perform various other personal functions will also probably be stressed by vendors over the next few years. This is particularly likely in the case of the $600 low-end micros that will become a factor in the market over the 1986-87 timeframe, and is reflected in the forecast for this sector (see Exhibit 6-1).

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International Resource Development Inc.

Exhibit 6-1

1983-93 Market Forecast: Misc. Personal Software

Units (thousands)	1983	1984	1985	1986	1987	1988	1990	1993
Household/Personal Financial	125	160	235	380	430	330	250	200
Misc. Financial	45	65	75	90	80	75	70	70
Continuing Education	5	15	45	70	90	100	125	125
"Paintbox"/Musical	8	16	40	70	120	150	250	400
	183	256	395	610	720	655	695	795

Average Pricing ($)	1983	1984	1985	1986	1987	1988	1990	1993
Household/Personal Financial	75	75	70	70	65	60	50	50
Misc. Financial	125	125	125	120	115	110	100	100
Continuing Education	75	70	60	60	55	50	50	50
"Paintbox"/Musical	40	40	45	50	50	50	40	40

$ Millions	1983	1984	1985	1986	1987	1988	1990	1993
Household/Personal Finance	9	12	16	27	28	20	13	10
Misc. Financial	6	8	9	11	9	8	7	7
Continuing Education	–	1	3	4	5	5	6	6
"Paintbox"/Musical	–	1	2	4	6	8	10	16
	15	22	30	46	48	41	36	39

SECTION 7   SYSTEMS AND PROGRAMMING PACKAGES

Although the trend in most areas of micro software is towards user-
friendly systems for those who are not technically competent, a healthy
market continues to exist for materials for the more skilled user.
This market is closest in terms of user profile to the original micro
"hobbyist" market which launched the industry, and the preferred system
among skilled users is still the Apple II (although a substantial body
of TRS-80 devotees exists, and the IBM PC is gaining in popularity among
those with an eye to the commercial market for PC applications software).

Types of Packages

Packages in this area can be divided into four main types: operat-
ing systems, languages, language processors (principally assemblers,
compilers and editors) and utilities. In addition, a fifth category --
of multifunction programming and/or utility packs -- is also starting
to appear.

Operating Systems and Languages: Although micro vendors typically
bundle an operating system and at least one language (usually BASIC)
with the system hardware, users will frequently buy additional packages
of different operating systems and/or languages.

CP/M support on the hardware of vendors of micros using proprietary
operating systems has created a long-standing market for systems
packages of Digital Research's various versions of CP/M, often bundled
with an interface card. However, as discussed in Section 2, CP/M will
increasingly give way over the next five years to Microsoft's MS-DOS
(i.e., IBM PC-compatibility) and this will replace CP/M as an option

on micros using proprietary operating systems, and to the newer multi-
tasking systems (principally UNIX/Xenix). Although these are likely to
start becoming standard (i.e., bundled) in the 1985-1986 timeframe,
there will also clearly be a market for systems packages for conventional
micros. Xenix will probably emerge as the leading product, but Digital
Research's MP/M looks like it is gaining a market for itself as well.
The leading "Dark Horse" is Softech Microsystems' UCSD-p, which may
take off if IBM continues to endorse it.

Among languages, BASIC remains the micro industry standard, with
FORTRAN and PASCAL more popular for scientific applications, and smaller
and more specialized markets for languages such as APL, PL/1, LISP and
FORTH. As discussed in Section 4, there is also a market starting to
emerge in the educational field for CAI-type languages such as Tandy's
PILOT and LOGO. In the longer-term, the "C" language used in UNIX and
its derivatives is also likely to become more popular as the operating
system itself comes into more widespread use.

Language Processors: These convert high-level program statements into
machine language and are staples for all who do some or all of their
own programming greatly increasing the ease and reducing the time spent
in program development. In general, the more skilled users will
program in assembly language, while the remainder will use compilers
and editors for the language of their choice. This is most commonly
BASIC, but there are also compilers and editors available for the
languages mentioned above. BASIC compilers are the largest market
area, although a handful of products are also available through normal

commercial distribution channels for FORTRAN, PASCAL and (more rarely)
less popular languages. Also of note is the appearance of a number of
micro COBOL compilers; this is likely to remain a fairly small market
for at least the next few years as the micro market does not yet seem
ready for mainframe software.

Utilities: There are 30+ types of product that can be considered as
utilities -- these mostly involve the performance of minor program
development functions and enhancements to system or peripheral perform-
ance -- disc utilities are one of the more common types of product.

Combined Packages: These are typically designed to provide a complete
"kit" for the programmer or to combine a variety of utility functions.
Examples are Digital Research's Speed Programming Pack, with versions
for the Apple II, IBM PC and CP/M, and Beagle Brothers' Utility City and
Apple Doc for the Apple II.

Vendors

Most of the products in this area are supplied by a handful of
vendors, with Microsoft, Digital Research, the micro hardware vendors
and a few smaller specialist vendors accounting for most of the business.
Microsoft holds the "high ground" -- its MS-DOS and Xenix are emerging
as the key operating systems in the market, and the company also markets
leading language and compiler packages for BASIC and FORTRAN and
assemblers for the major high-end micro systems and CP/M (the company's
BASIC compiler is the nearest thing to a best-seller in this market
area, and the only one that has achieved much visibility). Other
packages cover COBOL, PASCAL and "C."

<u>Digital Research</u> runs second with the various versions of CP/M (CP/M-80, CP/M-86, Concurrent CP/M and MP/M) and field a line of BASIC, PASCAL and COBOL language packs for the Apple II, IBM PC and CP/M.

All of the major micro vendors offer language, programming and utility packages, either their own (Atari, TI, Commodore) or from the larger software houses, and smaller firms have made an impact only in specialized packages or in low-cost utilities (Beagle Brothers, Sensible Software and Southwestern Data Systems all offer utility lines for the Apple II under $100).

Marketing Considerations

As mentioned earlier, the market for operating systems, language packages and programming aids is largely sewn up by a handful of software houses with a systems background and by the micro vendors themselves, and typically retailers will not carry large numbers of products in these areas. Staples will be a few of the more popular operating systems and anywhere between a half-dozen and a dozen language packs and programming aids for the major micro systems -- under the circumstances those who have established market leverage tend to keep it. (Specialist hardware outlets may carry more, but the real micro enthusiasts are sufficiently few to keep this a small market.) Only in utilities, which are typically in the $25-$100 bracket, is there much of an opening for new entrants. There are already more than a hundred products for the Apple II, but it is noticeable that the range for the IBM PC has to date been much smaller, and this is clearly going to be a growth area as the PC and its compatibles come to·dominate the

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market. In the longer-term, the multitasking systems will also be generating similar products.

Market Outlook

Despite the trend towards extremely user-friendly operating systems and simplified types of micro packages in most sectors, this market is likely to benefit from demand created by generational shifts in micro hardware and software over the forecast period, notably the emergence of multitasking systems on a large-scale in the 1984-1986 timeframe and a likely further shift over the 1990-1993 period. (By that time, however, we anticipate that advances in software development technology will have substantially reduced the effort required in program development and will result in a lower rate of market growth than over the earlier transitional period.) Exhibit 7-1 provides market forecasts for systems and programming packages.

EXHIBIT 7-1   1983-93 MARKET FORECAST: SYSTEMS AND PROGRAMMING

Units (thousands)	1983	1984	1985	1986	1987	1988	1990	1993
Operating Systems	65	85	125	185	160	150	150	250
Languages/Programming	120	135	220	300	320	250	280	300
Utilities	90	110	175	250	300	320	420	600
	275	330	520	735	780	720	850	1150

Average Pricing	1983	1984	1985	1986	1987	1988	1990	1993
Operating Systems	400	400	450	500	500	500	500	500
Languages/Programming	350	350	400	450	500	500	450	400
Utilities	50	50	50	60	60	55	55	50

$ Millions								
Operating Systems	26	34	56	93	80	75	75	125
Languages/Programming	42	47	88	135	160	125	126	120
Utilities	5	6	9	15	18	18	23	30
	73	87	153	243	258	218	224	275

SECTION 8   COMMUNICATIONS

Communications for micros emerged at an early stage of the market,
and have gained rapidly in popularity -- probably around 15% of all
high-end micros sold through retail outlets end up with a modem within
the first twelve months of purchase. With most of the simpler software
packages for communications running at less than $100, and modem costs
declining rapidly (by the end of 1983 300 baud units will probably be
around $100 and 1200 baud units in the $400-$500 bracket), communication
is becoming a cheap option. Over the next few years it is also clear
that the reduction of modem functions to VLSI will drop the cost to
negligible levels, causing micro manufacturers to build in modems as
standard hardware features.

To date, virtually all of the business in communications software
for micros has been in ASCII packages, providing micros with the same
basic characteristics as the low-cost ASCII terminals that constitute
the bulk of the corporate workstation market (in units, although not in
dollar terms). More recently, however, the market for more complex
emulation packages (notably IBM 3270) has begun to develop as the pene-
tration of micros into large organizations has created a demand for
communications features allowing them to act as workstations on host-
based systems using higher-level protocols.

Communications software is difficult to categorize as being in the
business or "home" market, largely because ASCII packages can be (and
are) used both for remote communications via modem and for interacting

with larger host systems operating under this protocol, and because
large numbers of business users use their micros at home.

Patterns of Micro Communications Usage

To date, micro communications have revolved around four types of
application:

i) Access to centralized computer services, notably The Source,
CompuServe and Dow Jones. These three services provide a variety of
central data bases such as business and financial data (Dow Jones'
speciality, but also offered by the other two), news wire updates,
product catalogs, publication abstracts, scientific and technical
information and airline schedules (CompuServe, for example, offers over
1,000 categories of data). In addition, they offer electronic mail,
timeshared program access, bulletin boards and the like.

Access is via an initial subscription and subsequent usage time,
and all of the major vendors of high-end micros have realized that their
offering these services provides a useful selling point. IBM has been
stressing the PC's ability to access Dow Jones, while CompuServe and
The Source are more popular with Apple users.

ii) Bulletin boards and networks. Just about everyone seems to
offer some kind of bulletin board and messaging service these days --
apart from the companies mentioned above, bulletin boards are available
on TYMNET and TELENET, the leading timesharing services, and are
provided by (among others), individual companies, vendors, computer and
software retailers, private organizations and specialized service firms.

iii) "Work at home." The ability to download files over telephone
lines has proved appealing to many text workers and programmers,

particularly those who work under contract as independents rather than
as full-time employees of companies. In addition, the advent of
portable computers has begun to create a substantial amount of usage
by sales staffs, representatives and others who travel frequently but
need to communicate data regularly to a central office. These are,
however, still fairly minor applications in relation to the micro
market as a whole, and while there has been much talk of such things
as "telecommuting" it is unlikely that this will develop on a large-
scale in the foreseeable future except among the self-employed and
programming professionals, i.e., in groups marginal to the main employ-
ment structure.

iv) Large organization workstation emulation. Many of the com-
panies currently encouraging their managers to use micros used to
encourage them to use terminals, and while micros may be useful for
day-to-day tasks such as memo-writing, calculations for a particular
department, product line, etc., most of a company's key data and
programs is still on host mainframes or minis, and some form of
communication with these is typically required at regular intervals.
A demand has thus been created for programs enabling micros to operate
as workstations on host systems, although its size should not be over-
stated. As discussed later in this section several of the larger
computer vendors have resolved this problem by combined hardware/software
packages enabling terminals to be "bolted on" to micros, and other
organizations have more prosaically opted for giving managers both
terminals and micros.

Types of Packages

In addition to the service access packages sold by The Source, Dow
Jones and CompuServe, there are two main types of packages -- ASCII
communicators and more sophisticated host protocol emulation packages.

ASCII Communicators: The ASCII communicators have been by far the most
popular type of communications packages to date, with the Apple II the
most commonly-used host. Packages are typically priced in the $20-$60
or the $100-$150 ranges, with products in the former providing basic
capabilities and the latter offering greater user flexibility in file
formats. Although there are more than forty products on the market, it
is dominated by a handful of packages -- largely because retailers and
distributors do not see the need to carry a broad range of very similar
(and typically inexpensive) products for this application.

The only two products that have got anywhere near best-seller lists
are Southeastern Software's Data Capture 3.0 at $30 (although the
company also markets a more sophisticated Version 4.0 at $65) at the
low-end and VisiCorp's VisiTerm at $150 at the high-end. Other notable
products include Tandy's TRS-80 Videotext at $30, Southwestern Data
Systems' ASCII Express at $50 with a high-end version, "The Professional"
at $130 and the same company's Z-Term at $150. With the exception of
Tandy's Videotext, these are all for the Apple II, although packages for
the IBM PC are also starting to move in the market.

Although the vendors of low-end micros (principally Atari, TI and
Commodore) also offer communicators, these have not to date been big
sellers, with most communications usage still occurring on the high-end

models. This is clearly going to change over the decade, but not as
fast as many analysts have been suggesting. The profile of the micro
communications user is still predominantly a business person accessing
services such as The Source, Dow Jones or CompuServe or a hobbyist or
self-employed person transferring files and/or accessing bulletin boards.
These are typically purchasers of Apples, IBM PCs, TRS-80s or CP/M
systems, and widespread use of micro communications on low-end models
in the TI 99/4A, Atari 400/800 and Commodore VIC-20 class is unlikely
to develop until the latter part of the 1980s.

Host Protocol Emulators: The principal functional requirements for
products in the host protocol emulator area is to allow communication
under mainframe protocols -- and as more than 85% of the mainframe
market is accounted for by IBM and Plug-Compatible Mainframe (PCM)
vendors, these are predominantly IBM bisynchronous. Although there is
a smaller market for such protocols as IBM 2780/3780, the vast majority
of demand in this area will be for 3270 emulation.

With more than three million 3270-type terminals installed world-
wide from both IBM and compatible vendors, and a growth rate in unit
shipments of upwards of 15% a year, 3270 workstations are the industry
standard for more sophisticated terminals, and comparable capabilities
for micros in organizations using IBM or PCM hosts have emerged as the
main demand from this area: micro vendors have been quick to offer 3270
emulation packages for their products, and there are a variety available
also from third-parties for such systems as the Apple II, TRS-80 and
CP/M-based micros, typically in the $500-$1,000 range.

The problem for vendors in this area is that a) the IBM PC is rapidly emerging as the main micro for large company use and b) IBM has its own plans. Although the company rather reluctantly offers a 3270 emulation package for the PC, it is stressing a hardware/software package which enables PCs to be "bolted on" to 3278 terminals for $1,700 (this approach was originally pioneered by DEC, with its VT-180, a similar "bolt on" for the company's popular VT-100 terminal). The cost of this solution is, however, likely to leave some room for third-party vendors with emulation packages, although dedicated IBM accounts should perhaps be avoided.

Sales of emulation packages are typically direct - few retailers carry them, and the centralization of large company micro purchases described earlier means that the vendor selling into this market will increasingly be dealing with central functions and in bulk lots. This is not recommended for smaller vendors without access to major distribution organizations.

Market Outlook

The market for micro communications hardware and software is clearly going to see major changes in the forecast period, not least in that micro vendors will increasingly regard communications functions as integral rather than add-on features and by the end of the decade we anticipate that virtually all shipped micros will have modem and/or local network functions built in.

In addition, the appearance of high-level videotext services on a large-scale over the 1985-1986 timeframe is likely to complicate matters

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(by high-level we mean systems using graphics-standard protocols rather than current services such as Dow Jones, The Source and CompuServe), with vendors of these services probably bundling communications functions into micro or dumb terminal hardware. In the large organization market the mutation of micros into "intelligent communicating workstations" and the inclusion of communications functions in integrated packages does not bode well for third-party suppliers of communications packages.

The net result of these developments will be to limit the market for discrete communications packages, and our projections for ASCII and more sophisticated host protocol emulation packages after the 1985-1986 timeframe are correspondingly pessimistic. Market growth will shift increasingly to data base access packages allowing users to hook up to various information services (i.e., users will increasingly be paying for information rather than technical capabilities). As it is probable that these too will be bundled into micro configurations and/or broader videotext services, the figures for this category of package should be taken as referring to this integrated type of function rather than necessarily to the discrete packages known today.

Forecast Assumptions: In projecting this market on a ten-year basis, the following assumptions were made:

- Growth following current patterns until the 1985-86 timeframe, when the integration and bundling of communications functions into micros and the availability on a large scale of high-level videotex services will start slowing the growth of ASCII and more sophisticated host protocol emulation packages. Conversely, database access products will begin to "take off" over this period.

- Pricing levels remaining fairly stable in all categories until the 1986-1987 timeframe, but with average unit prices in ASCII packages rising as simpler types of packages are phased out by bundled and built-in communications functions and market composition shifts in favor of more complex packages.

- Average access pricing for data base services increasing over the 1987-1988 timeframe as a result of the greater availability of more specialized and higher-priced packages.

EXHIBIT 8-1   1983-93 MARKET FORECAST: COMMUNICATIONS

Units (thousands)	1983	1984	1985	1986	1987	1988	1990	1993
ASCII	210	280	335	360	300	230	150	–
Other Host Protocols	12	18	22	14	11	7	5	–
Database Access	35	60	85	280	485	950	1250	1000
	257	358	442	654	796	1187	1405	1000

Average Pricing ($)	1983	1984	1985	1986	1987	1988	1990	1993
ASCII	65	60	55	65	70	80	85	–
Other Host Protocols	850	850	850	800	750	700	700	–
Database Access	50	50	50	50	55	60	60	50

$ Millions	1983	1984	1985	1986	1987	1988	1990	1993
ASCII	14	17	18	23	21	18	13	–
Other Host Protocols	10	15	19	11	8	5	4	–
Database Access	2	3	4	14	27	57	75	50
	26	35	41	48	56	80	92	50

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SECTION 9   DISTRIBUTION

Overview of the Distribution Structure

From its beginnings in the mid-1970s in a handful of computer
stores and a lot of mail order, the distribution of micro software has
come to involve a wide variety of types of outlets and of middlemen.
Over the last few years, distribution has begun to become differentiated
by sector.   The various segments are described below.

General and Standard Small Business Software: This still moves largely
via specialized retail channels, primarily computer stores, although
these have now been joined by stores dealing mainly in software lines,
accessories and computer-related publications. The main distributors
to these are still the micro hardware distributors, although they are
increasingly being joined by distribution companies specializing in
software lines. In addition, distribution to large organizations is
starting to show signs of emerging as a separate field. With a move
towards centralized purchasing and standardization of micro usage in
large organizations, software purchases increasingly involve bulk lots
acquired from a single source (the classic example of this has been the
recent purchase by United Technologies of more than 1,000 IBM PCs
equipped with the Context MBA package, single-sourced from ComputerLand).

Vertical Business Software: With shipment volumes typically low and
distribution economics unattractive, this is still at an early stage of
development -- to date, sales have been conducted largely by the
vendors themselves, usually via mail order for lower-priced packages or
direct sales where the product is sufficiently expensive to make this

cost-effective. In the longer-term, as discussed in Section 3, the
entry of OEM distributors is likely to alter the face of this sector
radically, making this group the primary mode of distribution.

Educational Software: The school market has begun to evolve its own
distinctive (and rather complex) distribution structure, with micro
vendors, educational publishers, audio-visual materials suppliers,
audio-visual equipment dealers, school furniture and equipment distri-
butors and specialist software firms arranging themselves in a wide
range of permutations. In the college market, a similar process is
likely over a longer timeframe.

Games and Other Personal Software: This software is starting to move
out of specialized retail outlets and into stores which serve consumer
markets. This trend, which is still at an early stage, reflects the
penetration of low-end micro hardware into households via these
channels. The whole low-end micro hardware/software market is clearly
going the same way as that for video games machines and cartridges,
with consumer retail and mail order channels becoming the primary means
of distribution for these products, and as low-end micros phase out
video games machines over the 1984-1986 timeframe, these channels will
become correspondingly more important in the micro software market as
a whole.

At the same time, the growth of micro software shipments via
consumer channels is starting to bring in distributors of other consumer
lines such as records, tapes, video programs and the like, and is also
leading specialized software distributors to develop mechanisms for
distributing to this sector.

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<u>Systems, Programming and Communications Software</u>: These buyers are
usually more sophisticated and technically competent users, and software
is likely to continue to move largely via specialized computer and
software retail outlets and to be handled by hardware and/or software
distributors.

<u>Distribution Economics</u>

With the exception of the educational (schools and college) and
vertical business sectors, the retail price of software packages
typically involves a breakdown of around 40% to the retailer, 10%-15%
to the distributor and the remainder to the author and/or vendor.
Mail order sales can run as low as 20%-25% below retail prices, with
allocation of sales dollars varying according to whether the vendor is
selling directly (which is normally the case for higher-priced items
such as business, systems and programming packages) or via a mail order
house (more normal for games or other personal software, particularly
for low-end micros). There is, however, wide variation between
individual products and product lines according to the degree of
responsibility assumed by the various parties for maintenance, returns
and user queries.

<u>Retail Outlets</u>

Retail outlets for micro software can be divided into three main
categories: computer stores (dealing primarily in micro systems and
peripherals, but typically also carrying lines of software); software
stores; and the various types of consumer retail outlets such as
department and mass-merchandising stores (typically large establishments),

grocery, drug and convenience stores and more specialized types of
outlet such as consumer electronics, record and tape, and book and
periodical retailers. Exhibit 9-1 shows approximate 1983 numbers of
outlets by type for the U.S.A.

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<u>Exhibit 9-1</u>

<u>Retail Outlets Capable of Handling Micro Software</u>

Department Stores	9,000
Other Major Retail	25,000
Grocery, Drug and Convenience	155,000
Consumer Electronics	60,000
Record Stores	15,000
Video Specialty Stores	7,000
Toy and Game Stores	9,000
Bookstores	20,000
Other Types	<u>20,000</u>
	320,000
Computer Stores	4,000
Software Stores	<u>250</u>
	4,250

<u>Computer Stores</u>: With over 4,000 retail outlets specializing predomi-
nantly in micro hardware (but also to a lesser degree in software) lines,
the micro computer store has to date dominated sales of both hardware
and software -- micro purchasers will typically buy one or more of the
major types of business packages (i.e., spreadsheet, word processing,

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DBMS and accounting) at the same time, with the initial software
purchase thus in the $250-$1,000 range. In addition, systems and
programming packages are usually bought by more sophisticated users
from computer stores.

It would be impossible to cover all of the major computer retail-
ing organizations (the fastest-growing sector has been in franchise
stores, a concept originally pioneered by ComputerLand, but there are
still large numbers of independents and small chains), but among the
more notable are:

A.   ComputerLand: With more than 400 outlets, and the total likely to
exceed 450 by year-end 1983, ComputerLand's brand name recognition and
early pre-emption of choice locations in many cities have made it the
leader among the computer franchise chains. The company supplies most
items to its franchisees at cost, taking an 8% share of its franchisees'
revenues. Facing complaints from many of the latter about its selection
and speed of delivery of software products, the company earlier this
year announced the creation of a specialized unit at corporate level to
handle software. Borrowing heavily from the techniques of independent
distributors such as Softsel and SKU, the ComputerLand program includes
"Earlybird" (i.e., advance) supply of packages expected to be good
sellers via agreements negotiated by ComputerLand corporate with vendors,
a staff for testing and evaluating new products and rapid delivery and
marketing support services. At last count, the program involved more
than 3,000 packages from 120 vendors, and the company has also negotiated
a number of exclusivity agreements for its franchisees (notably for the
Lotus 1-2-3, shared by independent distributor Softsel and Lotus itself).

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B. <u>Tandy/Radio Shack</u>:   Uniquely for a micro vendor, Tandy enjoys its own captive retail network of more than 3,000 Radio Shack stores and 400+ Computer Centers, which act as computer stores, specializing in micro hardware and software lines and with sales staff more qualified to give advice and assistance than is the case in most mainstream Radio Shack outlets.   In addition, the Radio Shack stores carry the company's low-end Color Computer and peripheral, accessory, book and software lines, and these have also been extended to more than 2,000 out-of-house retail outlets.   Software is carried by both groups, with the Computer Centers handling mostly higher-priced items and the other outlets packages for entertainment, miscellaneous personal and utility applications, largely for the Color Computer.

The computer stores are served variously by hardware and software vendors, hardware/software distributors, software distributors and, (for franchise outlets) corporate franchise organizations, with a wide range of permutations -- one computer store interviewed for this study, for example, was dealing with four different organizations for its software lines.

<u>Software Stores</u>:   The first stores to deal specifically with computer software started to appear in 1979-1980, typically (and unsurprisingly) in geographic areas which already had a number of computer stores, and by May 1983 there were upwards of 250 such outlets in the U.S.A., the majority of them independents or small groups of stores.

Software retailers are primarily "aftermarket" shops which serve customers who made their hardware and initial software purchases at

computer stores in the same area. Normally at least two computer stores
will be required in the immediate vicinity to support a specialized
software outlet, and the ratio is usually higher (particularly if there
are other types of outlets in the same area selling software and/or if
the area is not much into micro use), in the 3-4 range. It is likely
to settle down at around this level over the next five years, with the
extension of software products into conventional retail outlets such as
department stores, record and video shops and consumer electronics
retailers cancelling out the effects of the growth of consumer micro use.

While they do not usually stock system or peripheral hardware,
software retailers tend to carry a variety of accessory lines, and
books and periodicals related to micros are also typically a major
component of business (the proportion varies from store to store, but
is usually in the 10%-25% range).

The relatively slow pace of development of this sector thus far
can be attributed to the fact that most stores to date have been local
start-ups. This has begun to change radically over the last year with
the appearance of franchise organizations, of which there were more
than a dozen at last count, with more entering. By providing advice
on store location, training, ready-made layouts and a preselected
product line, these have greatly facilitated the entry of local entre-
preneurs into the business, and by 1984 these are likely to outnumber
the independents, remaining the fastest-growth software retailing
sector thereafter. (Like all "gold rushes," however, the software
franchise business is starting to have its casualties, and although

there has to date been little competition for franchisees, this is
likely to start occurring over the next few years, to the benefit of
the larger and more reputable operations.) Among the leading franchise
organizations are:

A. Computer Satellites (ComputerLand): Introduced by ComputerLand in
1981, the Computer Satellites chain is intended to serve the aftermarket
generated by ComputerLand stores in given areas. The company describes
the outlets as "feeding" the latter by supplying software packages,
books and hardware add-ons to users, and claims that evidence from test
stores indicates that they are not seriously competitive with mainstream
ComputerLand outlets. Focus of the software lines is typically on
lower-priced items (notably games, educational products, utilities and
other types of "home market" package) rather than on the more sophisti-
cated business and systems and programming packages sold by the Computer-
Land outlets, typically as first-time purchases by systems buyers.

ComputerLand plans 60 outlets for the chain by the end of 1983,
with the figure rising to around 200 by the end of 1984. They are being
located in areas which already possess more than one ComputerLand outlet.

B. Softwaire Centre International: A Los Angeles-based firm, Softwaire
Centre International began life as a single store but diversified into
franchising in 1982. As of May 1983, the company had 18 outlets open,
mostly on the West Coast, and claims that it will have 100 operating by
the end of 1983. This seems a bit of an exaggeration, and a more likely
figure would be 50-60 outlets.

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C. Programs Unlimited: Based in New York, Programs Unlimited began operation late in 1982, and as of May 1983 claimed 10 stores open or about to open, with 40 openings planned by year end 1983 and a target of 200 outlets by 1985.

D. The Program Store: Originating in Vienna, VA in 1979, The Program Store claims to be the oldest software-only retailing operation in existence. The company initially focused on company-owned stores (it now has five), but has now diversified into franchising -- 20 franchised outlets are planned by year end 1983, typically larger stores than the norm for this sector.

In addition, a large number of newcomers have either entered or are due to enter the business. It is notable that while the early chains began life as single stores or (in the case of Computer Satellites) as an offshoot of a larger group which beta-tested the concept thoroughly, the newer entrants have less or no direct experience of software retailing, and are often funded by venture capital. Among the more visible are Software City, Software Emporium and Microcon Software Centers.

Consumer Retail Outlets: The lower-priced, fast-turnover items (predominantly games, but including inexpensive educational and personal finance packages) have followed in the wake of video games and low-end micros such as the Commodore VIC-20, Atari 400/800, TI 99/4A and Timex-Sinclair into traditional consumer retailing outlets over the last two years.

A. Major Retail Chains: Among those that have been early entrants are Sears (in addition to its Business Systems Centers, it carries Atari and Timex-Sinclair low-end micro hardware and software lines and its own

"store brand" of video games), J.C. Penney, Macy's, K-Mart and Bullock's. It is probable that by the end of 1984 there will be few if any of the major chains' outlets not carrying these lines.

B.   Grocery, Drug and Convenience Stores: A few of the large chains in this sector have experimented with video game and low-end micro lines (notably Safeway, with the VIC-20), and this practice is clearly going to spread.   However, unlike the larger retail chains, which typically use large displays and/or specialized departments, stores in this category are unlikely to carry long lines and can be expected to focus on games with high-brand recognition (e.g., those associated with TV shows or movies), and to display them in the same way as they handle books or periodicals i.e., primarily as impulse buy items.   Video games will probably predominate until at least the 1985-1986 timeframe, when the low-end micro base in homes begins to overtake the latter.

C.   Consumer Electronics Stores: These typically specialize in TV, audio and video hardware but include specialist shops such as camera stores.   Many of these have been active in micro hardware retailing for years, albeit with mixed results.   Few have been able to compete with computer stores in serving the high-end (particularly business) market, where a fair amount of advise, "hand-holding" and a wide product range have proved useful, and low-margins and competition from mass-market retailers have helped make the low-end market equally unattractive. The more successful stores of this type have been those that have combined size and a wide range of consumer electronics lines, effectively offering the same type of facilities as computer stores.   This group is

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not a very significant factor in software distribution otherwise --
while some package sales may be made with system purchases, these stores
do not typically catch much of the software aftermarket.

D. Record Stores: With much of the record business in a depressed
state over the last few years, record store chains have been moving into
the video games cartridge business in a big way, and over 1982-1983 a
shift has also been apparent into low-end micro games packages. Record
retailers and distributors have generally felt comfortable with games
lines -- buyer profiles are similar to those of records and tapes, and
these lines have proved amenable to the same kind of display, packaging
and promotional techniques as have traditionally been used for records
and tapes.

E. Video Specialty Stores: Like record stores, this group's clientele
tends to resemble in terms of age and social profile users of micros
and video games units. Video specialty stores, whose main business is
the sale and/or rental of video programs (mostly movies) have also been
moving heavily into games cartridges, and a shift into low-end software
packages is also likely over the next few years.

F. Toy and Game Stores: Several of the major chains have entered the
video game and/or low-end micro business, notably Toys 'R Us and Child
World. Most business to date has been in games cartridges oriented
towards younger children (lines from Atari, Milton-Bradley and Parker
Brothers are major sellers), although there are the beginnings of a
shift towards micro packages, notably educational games. This trend
is likely to gain strength over the next two to three years as

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low-end micros erase the video games market and as educational games improve in quality and increase in visibility.

G. Bookstores: They have been latecomers to the software market, although they have an obvious asset in that their customer tend towards more educated groups in the population who are likely to be micro users. Moreover, many stores have found computer-related books to be well-selling lines (although the problem here seems to be that the buyer of books on computer-handling is typically a competent micro user who is also a regular visitor to his or her local computer or software store, and bookstores do not seem to have the right associations for this group). The leader in this area to date has been B. Dalton, which earlier this year began a 16 store test marketing program focused on games packages. In addition, in the U.K. book chain W.H. Smith's has been successful in both hardware and software retailing, and this example has been widely cited in the U.S. It should, however, be treated with caution, as much of its success is clearly derived from its exploitation of choice storefront locations in areas where there is little or no specialized retail competition. Software sales by bookstores are undoubtedly going to increase over the period covered by this study, but they are unlikely to be much of a factor in the market -- the typical format will clearly be for bookstores to carry standalone displays such as are used for best-selling paperback lines and/or small sections of total shelf space.

For most of the consumer retail sector, current distribution patterns for video games machines and cartridges can be taken as representative of what the micro package market is going to look like,

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with micro software reaching the same degree of penetration by the 1985-1986 timeframe and comparable volume two to three years thereafter.

The Rise of the Software Distributors

The proliferation of both software retail outlets and of vendors and products has led to a rapid boom in the software distribution business (i.e., in organizations acting as middlemen between vendors and retailers), with the result that within the last 18 months the "balance of power" within the software package market has begun to shift radically, with the middlemen emerging as a potent factor in product success and failure and in the economics of distribution. The new entrants can be divided into three main groups, although (as discussed later in this section) there is a substantial overlap between them.

1) Independent distributors. These have mostly started within the last 18-24 months, and have tended to focus on computer and software retail stores. They pre-select product lines for retailers, provide various advisory and support services to them and -- most important -- enable retail outlets to reduce inventory levels by ensuring rapid (typically within 24 hours) restocking of well-selling items. They are also able to secure better terms from vendors than retailers could individually.

2) Rack-jobbers. Long a feature of distribution for such products as cosmetics and records, rack-jobbers contract with retail outlets to provide in-store displays for a given product range which are maintained and stocked on a regular basis by the rack-jobber's own personnel.

3)   Video and audio products distributors. As discussed in
Section 5, the growth of the video games and low-end micro markets and
the increasing use of popular entertainment themes in games-type
products has brought into the picture the large entertainment conglom-
erates with diversified interests in movie-making, TV and radio program-
ming, video programs and records and tapes. The result has been that
their distribution networks for these products have also been brought
into play for software products.

The Independent Distributors: At last count there were more than
twenty independent computer software distributors, all of recent origin
and all growing exceedingly fast. As of May 1983 they accounted for
around 60% of the micro package market by retail value i.e., almost
$1 billion at end-user prices. Most of the distributors, however, offer
dealer prices which are typically in the 50% to 2/3 of retail price
range, with the average around 60%.

The distributors respond to three main sets of needs by retailers:

A.   Product Selection: Stores carrying package lines may carry anywhere
between 10 and 500 lines, depending on product mix (games in particular
are a volatile market, with retailers usually carrying a wide and often
changing range). Picking "winners" and "losers" in fast-turnover, low-
priced items would be a difficult task for most retailers, and even
higher-priced business packages such as accounting, word processing and
DBMS are available from dozens of vendors. All of the distributors
offer some degree of pre-selection, with the larger ones offering
sophisticated evaluation services and "best-seller" lists for retailers.

B. Inventory: By themselves maintaining the necessary levels of stocks
and ensuring rapid delivery to retailers (usually within 24 hours, using
regular delivery runs or overnight mail), the distributors have greatly
eased the average retailer's inventory problems, allowing smaller stocks
to be held and reducing the risks of understocking in key items and
overstocking in slow-movers. In addition, by providing a single point
of purchase, the distributor considerably reduces the paperwork and
time that would otherwise be spent in ordering.

C. Marketing Support: In addition to the above services, the distri-
butors also typically provide literature, display and promotional
materials and (more informally) advice on store layout and marketing.
A number of the leading distributors have also begun to offer coopera-
tive advertising programs which pool rebates from vendors to retailers
for advertising specific products which would otherwise involve the
retailer dealing separately with each vendor.

    Among the leading independents are:

D. Softsel: With 1983 revenues likely to exceed $100 million, 3,000
products from 225 vendors and a rapidly-expanding customer base that
stood at more than 3,000 dealers in May 1983, Softsel has emerged as
the clear leader in this field. (It claims, apparently accurately, to
be the world's largest distributor of micro software.) Much of the
company's success derives from its being the first in the field to
offer a fast and efficient (24 hour) delivery turnaround, and it has
preserved this reputation since. However, it has also pioneered a
variety of support services, including a weekly "Hot List" of best-

selling items (which also specifies whether, in Softsel's opinion, it is on the way up, holding stable or on the way down), a "Hot Line" responding to dealer queries, its "Headstart" program, which allows Softsel dealers to obtain advance copies of packages the company predicts will be best-sellers, and a cooperative advertising campaign. This had 65 participating vendors at last count, including Atari, Texas Instruments, Broderbund, Sirius, Datasoft and Lotus (vendor of the 1-2-3 integrated management package). In addition, the company offers displays, demonstration units (it is part-owner of CompuVision, which has developed a specialized in-store demonstration system) and a variety of advisory services.

Softsel has also cultivated close relations with vendors, using its distribution strengths to obtain a number of attractive deals, notably an exclusive (shared with ComputerLand and the vendor) on the Lotus 1-2-3 package and advance rights on 40 packages introduced by TI for its Professional Computer. The company also offers to vendors a series of advisory services on design, content and marketing.

E. SKU: Entering the market in 1982, SKU has launched a well-financed (apparently by venture capital) campaign to establish itself as a national distributor. SKU claims a customer base of more than 1,000 outlets, expected to reach the 3,000 level during 1983-1984. It places a strong emphasis on in-store marketing, providing display materials, and bundled "starter kits" for major micro systems including software, peripherals and accessories. These are reportedly useful additions to retailer lines and demonstration units. SKU has also attracted attention

with its "SKU Vans," a fleet of distinctive vans which circulate in
major centers served by the company and whose drivers provide regular
restocking, advice and substantial amounts of gossip to retailers.
The initials SKU originally stood for Stock-Keeping Units, although
the company now prefers Software Knowledge Unlimited.

F. Software Distributors: Although it has not been able to match SKU's
growth, Software Distributors is still Softsel's nearest competitor, and
also offers 2,000+ products from more than 200 vendors. The company
claims a dealer base of more than 3,000, and has specialized in business
packages, particularly CP/M-based -- more recently it obtained a joint
exclusive from DEC on software for its Rainbow, and has begun to expand
its games business.

G. Micro D/Service Software: A combined hardware/software distributor
whose lines include systems (principally NEC, TI and Timex-Sinclair),
peripherals, accessories and software, Micro D has been placing its
emphasis on micro packages, and claims upwards of 2,000 outlets for
its lines. In late 1981 the company also established a separate sub-
sidiary, Service Software, to provide rack-jobbing services to consumer
mass-merchandising stores, and whose activities are described later in
this section.

Like its retail counterpart, the micro software distribution
business is rapidly becoming a "gold rush" sector, with a larger number
of new entrants. Substantial amounts of venture capital also appear to
be finding their way into start-ups. Other distributors include
Hamilton Microsystems (a subsidiary of the large electronics distributor,
Hamilton-Avnet, and which carries both micro hardware and software lines),

High Technology Software (a combined hardware/software distributor which also markets its own packages for the Apple II), Micro Age (also owner of one of the larger computer store franchise chains), Micro Distributors, Software Distribution Services, Softsource, Software Wholesalers and Vitek.

Rack-Jobbing: Rack-jobbing originated in the 1950s for use in the then-burgeoning record industry and has since been extended to a wide variety of consumer products. It involves stores contracting with an outside firm for the latter to provide in-store display racks, inventory and promotional materials. The rack-jobber will typically be responsible for training, stocking and display arrangement decisions, and will usually have employees circulating around client stores to replenish stocks, change displays and occasionally mount in-store promotions.

Rack-jobbing has been particularly common in the record and tape business, and the depressed state of the latter has led many of the leading rack-jobbing firms in this area to diversify into games cartridges and (increasingly) micro software. Among those who have done so are Pickwick, Handelman, Lieberman and Largo, and three of the leading independent software distributors, Softsel, SKU and Micro D, have also entered this area.

A. Softsel/Pickwick: In February 1983, Softsel contracted with Pickwick Rack Services, a leading record industry rack-jobber, for the latter to carry Softsel lines in a number of leading retail chains (notably Sears, K-Mart, Montgomery Ward, Broadway and Bradlees). Under the agreement, Softsel is responsible for providing inventory and making

product selections, while Pickwick provides store personnel training and maintains in-store sales displays.

B. <u>SKU</u>: SKU has entered the rack-jobbing business on its own account, and has targeted consumer electronics and video specialty stores. Customers to date include The Record Factory, Video Concepts, Pacific Stereo and Musicland in California, Sam Goody's (audio equipment) in New York and five other chains throughout the U.S.A.

C. <u>Service Software</u>: A subsidiary of independent distributor Micro D, Service Software runs a software rack-jobbing service aimed at mass-merchandising stores. As of May 1983, the company maintained racks in more than 400 stores, including H.J. Wilson, Best Products, La Belle's and Modern Merchandising outlets, with a further 800 likely by year end 1983.

<u>Audio-Video Product Distributors</u>: The convergence of and competition between traditional entertainment products and video and micro games has brought in the large entertainment conglomerates with diversified interests in movies, TV and video programming and music, with the result that these have begun to use their existing distribution networks to carry games software. To date, most of their activities have focused on video games cartridges, and are still at an early stage. However, they are likely to be major players in the market as the latter grows over the next five years, and distribution networks carrying such products as videotapes and videodiscs, records and cassettes already reach large numbers of consumer outlets.

Among the leading players are:

A. <u>WEA Distributing</u>: Short for Warner Brothers/Elektra/Atlantic Records, WEA Distributing is controlled by Warner Brothers, and carries a variety of record and tape lines. More recently, it has also begun to carry video and micro games packages from Atari (also a Warner subsidiary).

B. <u>CBS</u>: Already marketing Coleco video game hardware/software outside North America and Japan, CBS has also recently entered the video games business via a line it advertises as Fastware (see Section 5). The company is using its existing distribution network for audio and video products for these, and will doubtless also do so for the micro games lines it has announced will be introduced over the next 12 months.

C. <u>Capitol Records-EMI</u>: The distribution arm of the British-based Thorn-EMI group, Capitol Records carries mainly record and tape lines, but has now also added the company's lines for the Atari 400/800 and VIC-20. Further expansion is planned.

D. <u>MCA Distributing</u>: A subsidiary of the MCA conglomerate, MCA Distributing will be adding products from the company's newly-formed games division to those already carried from MCA Records and MCA Video-cassettes. While these will focus initially on video games cartridges, a move into micro games software is planned.

Also entering the field: RCA Records, Columbia Records (CBS) and the 20th Century-Fox group.

<u>Systems Houses and Office Equipment Dealers</u>

As discussed in Section 3, the expansion of micros into the market previously occupied by small business systems and office products such

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as standalone word processors is bringing in the distributors and OEM sellers of these. At a conservative estimate, there are more than 2,500 systems houses handling small business system and minicomputer lines, and more than 4,000 dealers and distributors in office equipment in the U.S.A., the majority of whom are likely to be handling micro hardware/ software lines by the end of the forecast period. Now that both IBM and DEC have given a green light to the use of these groups for micro distribution, this sector is likely to be a fast-growth one, with systems houses becoming increasingly important players as micros phase out small business systems in the second half of the decade.

In terms of software, the office equipment dealers are likely to follow the same pattern as computer stores, focusing on a handful of the major types of business products (lines will generally be smaller than for the latter, however). Systems houses are likely to focus more on vertical applications, and the net result can be expected to be a major increase in average value of vertical software. As discussed in Section 3, where micro-based systems have been competitive with small business computer or minicomputer-based approaches, average software installations have been upwards of $5,000 against $1,500-$2,000 as the norm for most micro-based vertical systems at present.

Mail Order

Mail order, typically combined with periodical advertising, has for a long time been one of the major channels of micro software distri- bution. Most software vendors use mail order to some extent, if only to respond to mail inquiries, and it has proved particularly attractive

to vendors with diffuse and relatively small markets (e.g., educational software for schools and vertical business software) and to vendors of software for low-end micros (TS-1000 packages have been handled extensively via mail order, as has the hardware itself). In general, however, there has been a move away from mail order by vendors as markets begin to gather momentum, and we anticipate that mail order will constitute a declining percentage of micro package distribution over the forecast period, reaching negligible levels by the 1990-1993 timeframe.

Down-Loading

Currently attracting much attention, down-loading of software over telephone lines or via CATV networks is clearly going to be a major factor in software distribution over the forecast period, although it is unlikely to develop on any scale until at least the 1985-1986 timeframe. Current problems with the technology are likely to delay down-loading approaches (notably in that down-loading most packages at the 300 baud rate that is the current "state-of-the-art" would take hours), and several of those involved with software retailing and distribution contacted for this study also pointed out that while the software itself could be easily handled in this manner, documentation would still have to be provided from retailer stocks or otherwise delivered.

Nevertheless, the ability of down-loading approaches to respond to the problems which have favored independent software distributors -- the need for retailers to keep stock levels low and to obtain rapid delivery of packages that are selling well -- suggests that it will

prove attractive to retailers if it can be made cost-competitive with the type of services offered by companies such as Softsel, SKU and Micro D via mail, vans and the like.

In the longer-term, it is also likely that down-loading will be extended to end-user markets. While this approach is unlikely to be attractive to most business users, who prefer to purchase only after consultation with or advice from qualified staff, the home market shows better prospects, with games packages a prime candidate. One development that is relevant in this context is the recent announcement of The Games Network (TGN), a service that allows cable TV subscribers to access and play interactive video games over the cable. Scheduled to become operational in September 1983, it seems an obvious candidate for a service down-loading games to end-users, and several companies involved with games software and CATV are known to be investigating this possibility.

Among others, Softyme (a spin-off from computer services vendor Tymshare) has plans to offer a down-loading service for packages. The company's service, which is targeted at retailers, is scheduled to become operational in the fourth quarter of 1983, and over the next few years we anticipate that other and larger vendors will also enter the field. Early interest has come notably from IBM, which announced in March 1983 that it would be introducing a service allowing interactive access from demonstration systems in retail outlets to IBM PC programs maintained on a central host. This approach could be easily adapted to handle down-loading, and IBM is known to be working on this. Moreover,

it is probable that technology allowing program down-loading over public
telephone lines at 9600 baud will be available during 1984, with a 56
kilobaud rate feasible in the 1985-1986 timeframe, and this will do much
to popularize the viability of the down-loading approach.

<u>Outlook for Micro Software Distribution</u>

Like other sectors of the micro industry, software distribution is
evolving rapidly. Many of the major developments (e.g., the appearance
of the independent software distributors, the growth of software rack-
jobbing, the market entry of the entertainment conglomerates and the
emergence of a distinct class of software retailers) have only occurred
over the last 18 months, and it is also very early to quantify the
effect of down-loading on conventional means of software distribution.
With that caveat, we anticipate that the following will occur:

- The computer/software store sector, which in 1983 is likely to
  account for more than 70% of software dollar volume at end-user
  prices, will enjoy healthy growth for much of the forecast
  period, slowing only in the 1988-1993 timeframe as small business
  markets level off, consumer retail outlets and down-loading
  compete more effectively for games software, and direct marketing
  by vendors and OEM distribution isolate large organization and
  vertical markets from the traditional ComputerLand-type store.

- The major vendors of micros and/or small business systems will
  increasingly by-pass the traditional retail sector in selling to
  large accounts (via dedicated company sales forces) and the small
  business market (via OEMS, including systems houses, and other
  distributors and dealers). In the longer-term, when micro-based

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systems have pushed up into the upper reaches of the conventional small business systems market, vendor direct sales forces will also probably be brought into play to reach small business and particularly vertical markets -- we anticipate that this trend will become apparent in the 1986-1988 timeframe.

- Consumer retail channels will become increasingly significant as a means of distributing micro software, but with the focus largely on low-end micros games products as these machines phase out the video game player market, resulting in major volume increases over the 1986-1990 period. Other types of personal software such as home and personal finance/management will also penetrate these channels, but to a lesser extent than for games.

- Down-loading to the end-user (as distinct from the use of down-loading to supply retail outlets or dealers) will become a factor by the end of the 1983-1988 period, used mostly for to-home delivery of entertainment products, and by the end of the 1988-1993 period will be a primary mode of distribution of games software. (This projection could, however, be upset if one or more major market participants endorse this concept earlier.)

- The independent software distributors, collaborating with consumer market distributors (rack-jobbers, entertainment product distributors), will dominate much of the software distribution scene except for large organization and vertical business products, although the distribution arms of the entertainment

conglomerates will also operate independently of the independent distributors in many cases, notably in handling games products tied to popular and/or broader entertainment themes.

Ten-year projections for product types and distribution channels are shown in Exhibits 9-2 and 9-3.

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EXHIBIT 9-2   1983-93 FORECAST FOR MICRO PACKAGE DISTRIBUTION

As % Dollar Volume	1983	1984	1985	1986	1987	1988	1990	1993
General Business								
Large Org. Direct	10%	15%	20%	28%	38%	50%	55%	75%
Specialized Retail	84%	80%	76%	68%	59%	48%	45%	25%
Other	6%	5%	4%	4%	3%	2%	-	-
Small Business (standard)								
Specialized Retail	92%	90%	85%	81%	78%	72%	70%	65%
OEM/Systems House	8%	10%	15%	19%	22%	28%	30%	35%
Vertical Business								
Vendor-direct (1)	83%	68%	60%	50%	37%	25%	15%	12%
OEM/Systems House	11%	25%	33%	42%	55%	67%	80%	83%
Specialized Retail	6%	7%	7%	8%	8%	8%	5%	5%
Games								
Specialized Retail	65%	61%	54%	46%	36%	32%	27%	25%
Consumer Retail	27%	32%	40%	46%	53%	45%	40%	40%
Mail Order	8%	7%	6%	6%	5%	3%	3%	-
Down-loading (End User)	-	-	-	2%	6%	20%	30%	35%
Misc. Personal								
Specialized Retail	95%	92%	84%	73%	66%	60%	53%	45%
Consumer Retail	-	3%	12%	23%	31%	37%	45%	53%
Mail Order	5%	5%	4%	4%	3%	3%	2%	2%
Communications								
Specialized Retail	60%	56%	52%	43%	36%	26%	18%	10%
Vendor-Direct (2)	40%	44%	48%	57%	64%	74%	82%	90%
Systems/Programming								
Specialized Retail	76%	78%	70%	66%	65%	65%	63%	60%
Vendor-Direct/Other	24%	22%	30%	34%	35%	35%	37%	40%
Educational Institutions								
Vendor-Direct (3)	55%	65%	68%	72%	78%	82%	85%	90%
Third-Party	25%	22%	20%	20%	15%	14%	13%	10%
Mail Order	20%	13%	12%	8%	7%	4%	2%	-

Notes:
1) Includes mail order
2) Includes bundled
3) Includes out-of-house products marketed by vendors

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Exhibit 9-3

Distribution of Micro Packages By Type of Channel

$ Millions	1983	1984	1985	1986	1987	1988	1990	1993
Direct Marketing								
Large Organizations	73	174	328	681	1309	2105	3129	5130
Other Markets	87	173	500	817	839	713	390	246
	160	347	828	1498	2148	2818	3519	5376
Specialized Retail	1135	1838	2618	3393	4192	4416	4470	4015
Consumer Retail	162	326	635	906	1439	1623	2095	2347
Systems Hse./OEM/Dealer	22	80	299	701	1431	1991	1746	961
Mail Order	78	135	172	149	135	117	107	71
Down-Loading	-	-	-	38	195	665	1238	1814
Miscellaneous	10	16	31	48	95	126	150	75
	1567	2742	4583	6733	9635	11756	13325	14659

As % Total Market	1983	1984	1985	1986	1987	1988	1990	1993
Direct Marketing								
Large Organizations	5%	6%	7%	10%	14%	18%	23%	35%
Other Markets	6%	6%	11%	12%	9%	6%	3%	2%
Specialized Retail	72%	67%	57%	50%	43%	37%	34%	27%
Consumer Retail	10%	12%	14%	13%	15%	14%	16%	16%
Systems Hse./OEM/Dealer	1%	3%	6%	11%	15%	17%	13%	7%
Mail Order	5%	5%	4%	2%	1%	1%	1%	-
Down-Loading	-	-	-	1%	2%	6%	9%	12%
Miscellaneous	1%	1%	1%	1%	1%	1%	1%	1%

SECTION 10   SUPPLIER STRUCTURE

At last count, there were upwards of 1,000 companies selling micro software packages, with the greatest numbers in vertical software (more than 300 companies) and games (more than 250). In addition to the micro vendors, who between them will account for more than $265 million in software revenues in 1983 (i.e., 17% of the market at end-user prices), software companies range from VisiCorp (1983 revenues more than $65 million) to a multitude of "garage shops" with one or a handful of employees, conducting their business via mail order or direct contact with users, and with a tendency to disappear overnight. It is common to call firms with imposing-looking entries in directories only to find that their phone has been disconnected.

The major software vendors can be divided into four main groups: micro vendors, software houses with broad business and/or systems lines (as significant players in the market since the later 1970s, companies such as VisiCorp, Microsoft, MicroPro and Digital Research have been described as the "software establishment"), firms with a specialization in accounting packages and games specialists. In addition, Lifeboat Associates, a $25 million company that combines the roles of vendor and distributor, has also been included. See Exhibit 10-1 for vendor revenues.

Micro Vendors

The six major players in this group -- Tandy, Apple, IBM, Atari, Texas Instruments and Commodore -- reflect the picture in the hardware market, in which they dominate high-end and low-end micro computer

EXHIBIT 10-1   ESTIMATED 1983 REVENUES OF LEADING SOFTWARE VENDORS

($ Millions)

Micro Vendors		Major Software Houses	
Tandy	120	VisiCorp	65
IBM	35	Microsoft	40
Apple	25	MicroPro	35
Atari	25	Digital Research	25
TI	16	IUS	20
Commodore	12	Sorcim	15
		Ashton-Tate	15
Games Specialists		Software Publishing	10
Avalon-Hill	25		
Broderbund	20	Accounting Firms	
Sierra On-Line	20		
Adventure International	20	Peachtree	20
Datamost	15	BPI	12
Sirius Software	15	Continental Software	10
Diversified			
Lifeboat	25		

markets respectively. Software revenues are, however, much lower than those derived from hardware sales.

Tandy: With 1983 micro computer software revenues likely to be around $120 million, Tandy (also known as Radio Shack) represents something of a special case in this market in that it possesses its own captive distribution network of 400+ Computer Centers and more than 3,000 Radio Shack consumer electronics stores. This has enabled it to compete successfully with third-parties in supplying TRS-80 packages. In contrast to the other major vendors, Tandy has thus been able to capture most of the software market for its main systems, the TRS-80 Model III, 12 and 16. (The only exception to this has been in low-priced items, principally games, where companies such as Adventure International, Avalon-Hill, Automated Simulations and Big Five Software field lines of widely-distributed products.)

The company markets a full range of software for the TRS-80, including general business, standard small business applications, vertical packages (as discussed in Section 3, Tandy is the only major micro vendor to have seriously targeted micro vertical markets), systems and programming and various types of communications. In addition, as discussed in Section 4, the company has targeted the schools market for more than three years, and fields well-selling products in teaching support, computer training and educational management areas.

To date, Tandy's focus has been mainly on higher-priced business packages which have been handled by the Computer Centers, where trained staff are available to provide the necessary advice and hand-holding.

More recently, however, the company has extended micro hardware and software lines to the Radio Shack consumer electronics stores -- these now carry peripheral, accessory, book and software lines (mainly lower-priced educational and recreational games and utilities) and the Color Computer, TRS-100 and Pocket Computer systems.

With the Color Computer, Tandy is also starting to expand its focus to include the low-end micro market, with software targeted at "home" applications such as games, educational products and personal finance.

Overall, Tandy markets more than 200 packages, notably:

General Business -- The company's main lines are its Scripsit family of word processing packages, its Profile DBMS series (both of which started life as single products but have since given birth to families) and the TRS-80 version of VisiCalc.

Small Business -- Tandy fields a full range in this sector, including general ledger, accounts receivable, accounts payable, payroll, mailing list, order-processing, inventory management and sales analysis packages for the Models 12 and 16 and (less expensive) the Model III. In addition, the company offers a more sophisticated small business series for the high-end models which are capable of operating in interactive mode as part of integrated accounting/management systems.

Vertical Packages -- As discussed in Section 3, Tandy is the only major vendor to seriously target this area. It markets packages for lawyers (Litigation Support, at $300 a DBMS-based system for maintaining case records), medical practices (Medical Office System, at $750 a medical billing system), contractors (a job-costing package at $150) and users

such as stockbrokers, investment analysts and fund managers who track
or manage stocks (Electronic Broker, which combines DBMS and calculating
capabilities for securities transactions at $1,000) for the Models 12
and 16. In addition, the company markets a data base access package,
AgriStar, at $200 for the Model III, which provides access to the
independent AgriData Network service.

Systems and Programming -- These include a standard range of assemblers,
editors, BASIC, COBOL and FORTRAN compilers and utilities for the TRS-80
lines and the TRS-DOS operating system. Over the last few months the
company has also begun to market a development system using an adaptation
of the Xenix operating system and referred to as TRS-Xenis. It is
available at $750 for the Models 12 and 16.

Communications -- Tandy markets a full range of communications products,
including its own modems and a dedicated videotex terminal and a series
of software packages including its TRS Videotex, access packages for
CompuServe and Dow Jones and 3270 and 3780 bisynchronous emulators for
the Models 12 and 16 at $1,000 each.

Games -- This is not really Tandy's strong point, although it markets a
dozen packages for the TRS-80 and more than 30 for the Color Computer --
the most successful have apparently been adaptions of best-sellers
developed for other systems.

Over the period covered by this study, Tandy will have no problems
maintaining its high-end package business, which is mostly handled by
its captive Computer Centers, although its overall market share will
decline as other micro models (principally the IBM lines) achieve

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greater popularity. With the Color Computer, however, Tandy is going
to have a harder time keeping control of the software business -- this
appears to have been recognized, and the company is working extensively
with outside authors and vendors, notably in the education area but
also in recreational packages.

Apple: With 1983 software revenues of only about $25 million, Apple
has for most of its history paid little attention to micro software,
preferring to leave this to third-parties. Over the last year, however,
with competition heating up in the micro market, increasing the
company's software income has emerged as a corporate priority.

Apple's position in the software market has been dictated by two
factors:

1) Its hardware mainstay, the Apple II, has been in the market for
five years, and early on attracted a large number of quality products
from third-parties (notably VisiCalc, introduced for the Apple II in
1979). Although the company also markets the Apple II version of BPI's
General Ledger package, the only in-house product that has stayed in
the best-seller lists is its Applewriter word processing package.

2) After abortive efforts with the Apple III and IIe, most of the
company's efforts are now focused on LISA, and Apple clearly intends to
take more of the software revenue for this system than has been the
case in the past. The system is bundled with a set of applications
packages covering the mainstream types such as spreadsheet, word
processing, DBMS business graphics and scheduling and planning (but not,
as discussed in Section 3, small business applications -- a major blind

spot for a system supposedly targeted at small businessmen). The degree
of the company's success with LISA will, of course, depend on the market
performance of LISA itself, and that does not look very promising.

Apple II lines marketed by the company include:

Business -- The company's two leading business products are its Apple-
Writer ($145) and BPI-developed General Ledger and Accounts Receivable
packages (both $400). Apple markets a spreadsheet (Senior Analyst at
$300), a business graphics package (Apple Business Graphics at $175), a
scheduling and planning package (Apple Project Manager at $235) and
programs for mailing list (Applepost at $100), stock portfolio analysis
(Apple Portfolio Evaluator at $50) and real estate management (Real
Estate Analyst, an unusual package "folding into" VisiCalc, at $80).
With the exception of Senior Analyst, regarded as a high-quality product
but which has not sold well, most of these lines have achieved a rare
degree of unanimity from reviewers who regard them as being somewhat
mediocre. Market performance has reflected this.

Other Areas -- With the exception of an educational series co-developed
with the Children's Television Workshop and using characters from the
"Sesame Street" TV series (described in Section 4), most of Apple's
other packages have not made much of an impact on the market. The
company markets a dozen educational products, including math, spelling,
geography and music packages aimed at younger age groups, a version of
the PILOT CAI language, a personal finance package (Personal Finance
Manager at $75) and a number of games and utility programs.

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Given the company's poor performance in this area to date, and its dependence on the success of LISA, Apple is unlikely to be a major factor in this market during the second half of the decade.

IBM: With 1983 micro software revenues likely to exceed $35 million and only 18 months in the market, IBM is rapidly emerging as the dominant force in the micro market, both via its own sales and via the emergence of PC-DOS as the effective industry standard for single-tasking systems.

To date, IBM has preferred to work with outside software houses to develop micro software. Although the company also runs programs to encourage the submission of products by individual authors and small firms, and by IBM employees themselves, these have not been particularly successful and IBM obviously does not feel comfortable with this type of approach. The only area which it has kept under firm corporate control is communications packages and hardware attachments.

The PC was originally launched in September 1981 with operating systems by Microsoft (PC-DOS, a.k.a. MS-DOS, supplied bundled), Digital Research (CP/M-86) and Softech Microsystems (UCSD-p); languages and programming packages by Microsoft and Digital Research; business software by VisiCorp (VisiCalc at $200), Information Unlimited Software (IUS -- the EasyWriter word processing package at $200) and Peachtree (a set of five compatible modules covering general ledger, accounts receivable, accounts payable, payroll and inventory control at $600 each). In addition, five Arithmetic Games were supplied by Science Research Associates and the Microsoft Typing Tutor ($25) was adapted for the IBM PC. The success of these was variable -- Science Research Associates'

Arithmetic Games, for example, are not a popular line, and EasyWriter ran into much criticism. A medium-power package which left much to be desired, the package was the result of a compromise between the Entry Systems Division (responsible for the PC) and IBM's Office Product Division, concerned to protect the Displaywriter.

During 1982 IBM also adopted further packages from Microsoft, its Multiplan spreadsheet ($250) and Decathlon and Adventure games ($30); Software Publishing's PFS:File ($140) and PFS:Report ($125); and four packages from its Software Submission Program, Personal Editor ($100), Basic Programming Development System ($130), Diskette Librarian $45) and Casino Games $35). Again, results were variable -- Multiplan and the PFS programs have sold well, but the games and the packages from the submission program have not made much of a dent on the market.

Finally, in March 1983 IBM introduced a third group of packages, this time for the XT -- operating system again by Microsoft, and word processing and accounting packages by Peachtree (Peachtext at $400, five accounting modules paralleling those for the PC at $600 each). The new word processing package is an improvement on EasyWriter, and suggests that the Displaywriter advocates lost the battle on this one.

Despite the PC's success in the micro market, IBM's software line is not particularly innovative or outstanding, and the company's policy is clearly to focus on a limited number of products which have already proven themselves in the market. VisiCalc, Multiplan, the Peachtree series and the PFS programs were already well-established by the time IBM picked them up, although this has been less the case with the two

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word processing packages the company has adopted. In the future, it is likely that IBM will continue to "play safe" by adopting third-party packages only when they have already shown a track record of market performance and working with the larger software houses on pre-release developments.

As discussed in Section 2, the probability is that IBM will extend its personal computer downwards into the under $1,000 bracket and upwards into small business systems territory over 1983-1985. It is unlikely to do much in the way of in-house development for low-end packages, but may work with educational and games specialists -- the majority of software, however, is likely to be supplied by third-parties. In the small business systems software bracket IBM is likely to be more active -- this is an area in which IBM feels comfortable, and in the past has introduced a variety of standard small business applications and vertical packages on systems such as the S/23 and 5100 (abandoned in favor of the PC in 1981).

IBM supplies its own communications software, principally 3101 and TTY emulators ($140 and $60 respectively) and bundled hardware/software units for converting PCs into intelligent 5250 and 3278 terminals (at $900 and $1,700 respectively). IBM does not like most emulators much -- a 3270 emulation package, for example, was held off the market for at least 12 months until the 3278 "bolt-on" became available -- and its strategy for large account micro use involves integrating PCs into IBM communications systems rather than providing emulation capabilities for its products.

<u>Atari</u>:   With 1983 software revenues of more than $25 million, Atari has been the most successful of the low-end micro vendors, largely as a result of games packages for the 400/800 carried over from its video game business.   (It is notable, however, that the company has had considerably fewer micro titles in best-seller lists than video game titles, a reflection of greater competition in micro software.)   Its more successful titles have tended to be those which have already been best-sellers as games cartridges -- examples are Pac Man, Centipede, Space Invaders and Donkey Kong -- or which use popular entertainment themes (recent examples have been E.T. Phone Home and Superman III) which derive from its connections with its parent, the Warner group. In addition, the company has targeted more "serious" applications such as business, education and personal finance and management.

<u>Education</u> -- The company's products for younger age groups have already been described in Section 4.   In addition, it offers a series of packages for "continuing education," a computer training program (three programs at $25 and $30) and four programs for teaching French, German, Italian and Spanish ($60 each).

<u>Business</u> -- Atari markets several programs in this area, notably two bookkeeping packages, The Bookkeeper ($150) and The Bookkeeper Kit ($250).

<u>Home Finance and Management</u> -- Although they have been less successful than packages for high-end micros, Atari offers Home Filing Manager ($50), Family Finance ($50) and Home Manager Kit ($80).

Other products include systems and programming packages from Microsoft ($90-$100) and a handful of Atari-developed utilities.

To date, Atari's attempts to break into the markets traditionally reserved for high-end micros have not been notably successful, and its future in the micro software business will be dependent on two factors:

1) How the company resolves the competition between video game units and low-end micros. To date, Atari has attempted to keep the two lines separate (it has upwards of 60% of the video games market), but it is unlikely to be able to maintain this position. With the competition putting low-end micros down into the video games unit price bracket, and with Commodore offering trade-ins for VIC-20s on the latter, Atari will probably have to merge the two over the next two to three years, creating a larger games software market -- it is, however, unclear whether the company's success in video games would carry over in this case.

2) Whether the company will try and follow Texas Instruments' upmarket thrust. Although it does not appear to be contemplating entering the high-end micro market (its image would be a considerable drawback), keeping up with price/performance trends in low-end machines will inevitably oblige the company to introduce more powerful systems -- like IBM, it is aware that a substantial amount of micro business processing occurs in the home.

Texas Instruments: Currently cited as the example of the strategy of how not to succeed in the micro market, Texas Instruments (TI) has turned out to be the main victim of the price war which it initiated in early 1982 in low-end micros, with margins calculated on a growth rate that failed to materialize. The company will probably gross around $16 million in micro software revenues in 1983, largely in low-priced

lines for the 99/4A but with the Professional Computer starting to make a contribution later in the year.

Like Atari, the company has targeted "serious" business, educational and home finance and management applications, but unlike the latter it has not made much headway in games -- although it markets a number of games packages, the bulk of this business is going to third-parties. Its educational products have already been described in Section 4, although like Atari it has programs targeted at the "continuing education" user (notably a BASIC self-teacher for $30). Other products include a batch of home finance and management titles -- Home Financial Decisions ($30), Household Budget and Management ($40) and Personal Record Keeping ($50) -- and several business products (including, ambitiously and to date not very successfully, a version of Microsoft's Multiplan spreadsheet at $100).

With the Professional, an MS-DOS-based high-end micro, TI has also gone after the high-end vendors (principally IBM). Like IBM, it has used outside software houses for initial package offerings, and the 40+ products introduced with the Professional were developed by Ashton-Tate (dBase II, operating under CP/M, and related packages), Digital Research (systems and programming), IUS (EasyPlanner at $250 and EasyFiler at $400), Infocom (the Zork games series), Lotus (1-2-3 at $500), MicroPro (a dozen products, including WordStar and its family), Peachtree (six accounting packages at $750 each), Software Publishing (PFS:File and PFS:Report, priced as for the IBM PC), Sorcim (SuperCalc at $200, operating under CP/M, and its family) and Enhanced VisiCalc at $400.

Exactly where TI is going in the micro market is not entirely clear (recent developments suggest that this situation extends to TI itself), but it seems to be aiming at two brackets: the low-end, where it will attempt to lead the price/performance trends by retargeting with a more powerful 99/8 in the $500-$600 range (which will put it head-on with IBM) and the high-end, where it appears to be aiming to become the main IBM-compatible high-end micro supplier. It would, however, be difficult to predict the company's performance in either the hardware or software market until it has sorted out new strategies in the wake of its recent financial difficulties.

Commodore: With 1983 micro software revenues likely to be around $12 million, Commodore's strengths in marketing low-end micro hardware do not seem to have carried over into software packages. Packages marketed include more than 20 games (including a set developed by specialist Scott Adams) ranging from $10 to a combo pack at $60, a personal finance/ management pack at $60, utilities and programming aids. To date, none have been market leaders, but they sell steadily via the company's dealer network.

Software Houses

The firms in this category are independent software developers whose only or principal business is in micro packages and/or operating systems (it is notable that over the last year several of them have also begun to diversify into printed publications on their products and on more general micro-related subjects). Most of this group date from the 1970s, and have built their success around a single successful

product -- VisiCalc for VisiCorp, the CP/M operating system for Digital Research, WordStar for MicroPro, dBase II for Ashton-Tate, SuperCalc for Sorcim, EasyWriter for Information Unlimited Software (IUS) and PFS:File/ Report for Software Publishing. Microsoft had already built up a successful business in programming aids and languages before IBM's decision to focus on MS-DOS for the company's PC put them on center stage of the micro software industry. Without exception, this group is privately-owned (to the considerable chagrin of the venture capital community, which has, however, been actively funding other start-ups), although it is likely that in the future they will go public. In the meantime most of them have concluded one or more "special relationships" with micro vendors -- Japanese firms have been particularly visible in seeking tie-ups with this group, and the IBM-Microsoft relationship is well-known.

VisiCorp: Originally named Personal Software Inc., the company changed its name to VisiCorp when it shot to prominence in 1979-1980 with VisiCalc. By the beginning of 1983 the company had sold more than 300,000 VisiCalc packages (equivalent to more than $75 million at retail prices) which also greatly helped to spur micro sales. VisiCalc, still the best-selling single product in micro software and now on its third generation, remains the company's best-selling product although it has now been expanded to a family that includes VisiFile and VisiDex ($250 DBMS packages), two business graphics packages, VisiPlot ($200) and the more sophisticated VisiTrend/Plot ($300), an ASCII emulator, VisiTerm ($100) and a series of business planning titles, VisiSchedule ($300),

Desktop Plan II ($250) and Business Forecasting Model (a $100 add-on module for VisiCalc). These account for the bulk of the company's business, and several members of the family, VisiFile and VisiTerm, have made it into best-seller lists on their own account (the company's word processing package, VisiWord, was a rare failure).

With 1983 revenues likely to be around $65 million, VisiCorp is the largest of the independent software houses, with most of its products available on all of the major high-end micros. It is also proving to be one of the more innovative, with its VisiON operating system (a major achievement, considering that it was developed on the same lines as Apple's LISA but with much smaller resources).

VisiCorp's main target at present is IBM corporate environments. VisiON, targeted at corporate managers, was introduced for the IBM PC, and in April 1983 the company also announced that it was acquiring Communications Solutions Inc. (CSI), a small specialist software developer of IBM's Systems Network Architecture (SNA), and was forming a joint venture with Informatics General Corporation, a Los Angeles-based firm specializing in host data base software. The joint venture will develop a product referred to as VisiAnswer which will allow PC access to the host data base operating under Informatics General's Answer/DB software.

Microsoft: Founded in 1974 and one of the oldest microsoft houses, Microsoft's involvement in the microcomputer field dates back to the Altair, and the company has specialized until recently in systems and programming packages. It had the good fortune to develop MS-DOS,

chosen by IBM as the main operating system for the IBM PC, and its implementation of UNIX for micro environments, Xenix, is emerging as the leading variant of the Bell Laboratories operating system. (As discussed in Section 2, Microsoft will be marketing Xenix systems packages for LISA and the IBM PC later this year.) The company's programming packages include languages and compilers for BASIC, FORTRAN, COBOL and Applesoft and assemblers and utilities -- all of the major micro lines and CP/M are represented. In addition, the company's Softcard, a plug-in unit allowing Apple II users to run CP/M, has also been a heavy seller, and it now markets half a dozen Z-80-based products for the Apple II.

Microsoft has also introduced games (Adventure and Decathlon, both $30 for the Apple II, TRS-80 and IBM PC, and the sophisticated simulation package, Flight Simulator at $50 for the IBM PC, which has been very favorably received) and education products (notably Typing Tutor, at $25 for the Apple II and IBM PC). It has also entered the general business market with its spreadsheet, Multiplan ($275 for the Apple II, IBM PC and CP/M, and since expended to include a $100 forms generator and a $150 budget analysis module).

Like VisiCorp, Microsoft is placing much of its focus on the IBM PC, although with a considerably closer relationship with IBM. Apart from its initial tie-up with IBM for MS-DOS/PC-DOS, it was responsible for the 2.2 variant of the system for the IBM XT and its Japanese associate, ASCII Microsoft, developed the operating system for the IBM 5550 Kanji-processing system. Moreover, IBM has also adopted a number

of Microsoft packages for the PC for its own direct marketing, notably Decathlon, Adventure, Typing Tutor and -- more significantly -- Multiplan, and the company is known to have collaborated with IBM on Xenix implentations for the PC/XT and on a Xerox PARC-type operating system for IBM micro environments.

How this relationship will work out in the long run is still unclear, but at the moment it is apparent that Microsoft is IBM's favorite software company.

Digital Research Inc.: With 1983 software revenues likely to exceed $25 million, Digital Research has been one of the star micro software houses and was founded in 1975 by Dr. Gary Kildall, developer of CP/M. CP/M-related systems business has remained the company's main activity, and it now markets four variants: CP/M-80 (the original version) for 8080/85 and Z-80 machines, CP/M-86 for 8086/88 and comparable variants for MP/M, a CP/M-compatible multitasking system. In addition, the company markets a line of BASIC, COBOL and PASCAL language packages for the Apple II (requiring a 7-80 card), IBM PC and CP/M-based systems and a number of utilities.

MicroPro International: With probable 1983 revenues of $35 million, its success derives from its WordStar package, the best-selling word processing micro software product (with more than 25% of the market in this type of package). The company has expanded from WordStar into a compatible family that now includes a dictionary, SpellStar ($250); a spreadsheet, CalcStar ($150); two DBMS packages, DataStar ($300) and the more sophisticated Infostar ($500); a report-generator, ReportStar

($350); a mailing list package, MailMerge ($250); SuperSort ($250),
which provides sorting, merging and related functions and French,
German and Spanish versions of WordStar. Most of these products are
available for the Apple II, IBM PC and CP/M.

Information Unlimited Software (IUS): Founded in 1979 and with 1983
software revenues likely to be around $20 million, Information Unlimited
Software markets a range of general and small business packages for the
Apple II and IBM PC, including a series of three accounting programs
(General Ledger, Accounts Receivable and Accounts Payable at $500 each)
capable of operating as an integrated series and its "Easy" series,
derived from the company's successful EasyWriter word processing package
which was first marketed in 1980 for the Apple II. It was, however, the
adoption of a variant of the package by IBM for its PC which put the
company on the map. Since then, the company has added a family of
products, including EasySpeller ($125), EasyMailer ($70), Easy Filer
($400) and Easy Planner ($250), a generally well-received spreadsheet
package. In addition, the company has upgraded the original EasyWriter
package for both the Apple II (Professional EasyWriter at $175 for the
Apple II and EasyWriter II for the IBM PC at $225). The IBM PC Easy-
Writer encountered considerable criticism, and it is probable that IBM
deliberately specified a limited capability package to protect its
Displaywriter, and EasyWriter II has been marketed by IUS independently.
IBM also moved to Peachtree for its XT word processing package, and
there may be some relationship between this and IUS' decision to develop
relations with Japanese micro vendors: it will be developing custom
software for at least one of the latter.

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Sorcim: Founded in 1975, to capitalize on the embryonic microcomputer market, the first stages of Sorcim's career focused on systems and programming packages for the major micro lines, none of which made much impact on the market. More recently, it has joined the leaders via its SuperCalc spreadsheet for the IBM PC andCP/M at $200, and has added a word processing package, SuperWriter ($300) and an enhanced version of SuperCalc at $300. The company will probably extend this line. The 1983 software revenues will probably be around $15 million.

Ashton-Tate: With 1983 revenues likely to be around $15 million (similar in size to Sorcim), Ashton-Tate's main product has been its dBase II data base management system package, a veteran of the best-seller lists and available for CP/M and the IBM PC (under CP/M-86) at $700. The company has added a number of other titles, including Bottom Line Strategist, a $400 financial planning package and the specialized Financial Planning Language ($700), but it remains basically a one-product company.

Software Publishing Corporation: SPC's main products have been the PFS (Personal Filing System) duo, the PFS:File DBMS and PFS:Report report-generator at $125 and $95 respectively for the Apple II and $140 and $125 for the IBM PC. These have since been joined by a business graphics package, PFS:Graph, and a word processor, PFS:Write at $125 for the Apple II and $140 for the IBM PC. The company will probably gross around $10 million in 1983.

Accounting Firms

The firms in this category have focused on small business account-ing and management applications, and despite a somewhat staid reputation,

several of them -- notably Peachtree Software -- have shown themselves

capable of competing effectively in other areas. The more successful

of these are discussed below:

Peachtree Software: With 1983 revenues likely to be around $20 million,

Peachtree's main product lines have been a full range of applications

programs for CP/M, since extended to the Apple II and adopted by IBM

for its PC. In addition to single applications packages, the company

also markets three "Peachpaks" which combine multiple functions and

which can operate as an integrated system, Peachpak 4 (General Ledger,

Accounts Receivable, Accounts Payable, Inventory Control and Payroll),

Peachpak 40, a less sophisticated version of the same, and the more

high-powered Peachpak 8, which includes a Sales Invoicing module and

various financial analysis capabilities.

The company also markets word processing (Peachtext) and Mailing

List (Mailing List Manager) packages and assorted add-ons for word

processing, including Spelling Proofreader, specialized spelling

packages for legal (Black's Law Dictionary) and medical (Steadman's

Medical Dictionary) applications, a Thesaurus, and an integrated package

combining Peachtext, Mailing List Manager and Spelling Proofreader.

More recently, it has targeted general business applications --

its PeachCalc spreadsheet ($375) has made the best-seller lists, and it

also offers Business Graphics ($475) and Calendar Management ($375)

fold-ins, all for CP/M. The company also enjoyed a re-affirmed

commitment from IBM when the latter selected it to provide the account-

ing and word processing (Peachtext) packages introduced on the XT in

March of this year. With IBM's increased emphasis on small business applications, and the good relationships Peachtree apparently enjoys with the company, its prospects look good. This is one company that has emphasized quality packaging of its software, which may have helped its impact on customers.

BPI: With 1983 revenues likely to be around $12 million, BPI is best known for its General Ledger package for the Apple II, which is a veteran of the best-seller lists. The company also markets Accounts Receivable, Accounts Payable, Payroll and Inventory Control packages for the Apple II in the $400-$600 bracket, and vertical packages for churches (Church Management at $500) and contractors (Job Costing at $600), and has more recently introduced a Personal Accounting package ($200). The company has been slow to diversify away from the Apple II, but is now targeting the IBM PC.

Continental Software: The bulk of Continental Software's 1983 software revenues of $10 million are likely to be accounted for by its highly successful Home Accountant, at $75 for the Apple II, IBM PC and Atari. The company also markets General Ledger, Accounts Receivable, Accounts Payable and Payroll packages at $250 for the Apple II and several games titles.

Games Companies

With upwards of 250 companies participating in the games market, a high turnover and companies and products appearing in -- and disappearing from -- the best-seller lists with great rapidity, this sector tends to be volatile. While many companies are making ends meet, only a few

have succeeded in establishing themselves as industry leaders. Among
these few are the following:

<u>Broderbund Software</u>: With 1983 revenues likely to be over $20 million,
Broderbund's success has been due to a combination of good products and
aggressive advertising and marketing. It has had several best-sellers,
notably Choplifter (at $35 for the Apple II and Atari) which has been
in best-seller lists for more than a year, and David's Midnight Magic
(ditto), a game that recreates the format of arcade pinball games. The
company markets more than 50 games titles, including The Arcade Machine,
a $60 package which allows users to create their own arcade-style games.
More recently, the company has also begun to diversify into business and
education titles. It markets the Bank Street Writer word processing
package ($70 for the Apple II and Atari), originally developed by the
Bank Street School for training applications but which Broderbund is now
advertising as a user-friendly package for home use, and Accounts
Receivable, Accounts Payable and General Ledger packages for the Apple
II.

<u>Avalon-Hill</u>: With its main activities in periodical publishing and
board games (mostly strategy), A-H has now diversified into software
products via its Microcomputer Games Division. The company markets
more than 150 titles for the Apple II, TRS-80, Atari and IBM PC,
covering all games types. While it has had few best-sellers, its games
business remains healthy and its marketing network for board games
leaves the company well-placed for the future. The 1983 revenues from
games software will probably be around $25 million.

<u>Datamost</u>: With 1983 revenues from micro software likely to be around $15 million (one of the smaller games companies), Datamost markets more than 40 titles for the Apple II, Atari and IBM PC. The company has had a number of best-sellers, including Snack Attack, which has been on best-seller charts for more than a year, and also markets several business packages for the Apple II and IBM PC.

<u>Sierra On-Line</u>: With 1983 revenues from microcomputer software likely to be over $20 million, Sierra On-Line (which changed its name from On-Line Systems) is best known for its Frogger game for the Apple II and Atari, an adaptation of the successful arcade game, and for its successful Screenwriter II word processing package for the Apple II at $130. Most of the company's lines are games for the Apple II, Atari and IBM PC, but it also markets a series of business titles, including Screenwriter II and dictionary add-ons.

<u>Sirius Software</u>: With 1983 micro game software revenues of over $15 million, Sirius Software markets more than fifty games titles for the Apple II and Atari.

<u>Adventure International</u>: With 1983 revenues likely to be over $20 million, Adventure International specializes in adventure games for the high-end micro models. The company markets upwards of sixty titles, including its S.A.G.A. series, which has to date run to 12 packages.

<u>Lifeboat Associates</u>

Difficult to categorize, but a major player in the market ($25 million in micro software-related revenues in 1983), Lifeboat Associates combines the activities of software developer, distributor and mail

order house (mail order sales account for around 25% of revenues). The
company offers more than 300 packages for CP/M and MS-DOS, mostly
business and systems and programming, which it distributes via mail
order -- unlike most mail order companies, it provides a full service
commitment -- and its own dealer network. It thus tends not to be
visible in mainstream distribution channels. Lifeboat's somewhat idio-
syncratic approach does not appear to have encourged any imitators.

Rising Stars

In addition to those described above, a number of firms should be
mentioned whose 1983 revenues are likely to be relatively small, but
which can be expected to be major vendors over the next few years.
These include the two early vendors of integrated management packages,
Lotus Development Corporation and Context Management Systems, developers
of the 1-2-3 and MBA respectively; and the games software arms of the
entertainment companies, notably CBS Software and Thorn-EMI which have
been early entrants from this area with heavily-marketed games packages
for low-end micros. This group may take a while to find its feet in
the market in the package market, but will clearly be major players in
the long-term. Among micro vendors DEC is clearly going to be a major
force in both hardware and software markets, and it is difficult to see
how ATT could be anything else -- it is one of the few companies (IBM
being another) that would find it difficult not to be a major player.
The Japanese micro vendors bear watching; as matters stand, they are un-
likely to have much of an impact except in the long-term in the low-end
micro market, but this picture could change if the various efforts being

made in Japan to standardize micro hardware and operating systems bear
fruit. Finally, whoever is selected by IBM for the operating system on
its next generation of micro products (assuming it is not developed in-
house) is inevitably going to be a major player -- while Microsoft is
current favorite, it is by no means clear that the company will not
select a smaller developer's product.

Overseas Tie-Ups

Most of the major vendors have some overseas business, either
directly (the micro vendors) or via local distributors. Over the last
year, however, many software vendors have been actively purusing tie-ups
or distribution agreements with Japanese partners and (to a lesser
extent) local firms in other foreign markets -- the U.K. and other
English-speaking countries have tended to be the fore.

Among the more notable:

Microsoft, via its local agent, ASCII Microsoft, has been active in
Japan both in developing the Kanji operating system introduced on the
IBM 5550 and Japanese-language applications packages, and in the
development of the Z-80-based MSX standard recently adopted by 14
Japanese micro vendors. The status both of Microsoft's relationship
with IBM in Japan and of the MSX program were, however, in doubt at the
time of writing.

Digital Research, has been actively negotiating with Japanese companies
to support its CP/M and MP/M standards, and is seeking tie-ups with
Japanese vendors. At the time of writing, it was also seeking to per-
suade Japanese firms to adopt a Digital Research-developed standard in
place of the MSX system.

<u>Softech Microsystems</u>, developers of the UCSD-p operating system, have seen the latter arouse considerable interest in Japan and even become the subject of a government-sponsored R&D program to design an operating system capable of handling videodisc memory.   The company is also seeking Japanese collaborators.

<u>IUS</u>, has targeted Japan as a major growth area for its business, and is likely to be working with at least one Japanese micro vendor to develop appropriate packages for their systems for the U.S. market.

SECTION 11   MARKET CONCENTRATION AND STRUCTURAL TRENDS

For a sector not much over five years old, the micro software business has developed rapidly -- allowing for retailer and distributor margins, software vendors as a whole will probably gross over $800 million in U.S. revenues during 1983, with independents accounting for around $550 million. Distributors acting as middlemen will add a further $250 million, and unsurprisingly this field has attracted large amounts of venture capital and has seen the beginnings of a series of mergers and tie-ups which can be expected to change the structure of the industry considerably over the forecast period.

Market Concentration

Over the last two to three years, most sectors of the micro package market have seen a tendency towards concentration, with a small number of companies coming to dominate the market. The exceptions to date have been in vertical business packages, where distribution economics have deterred most major vendors from participating; the educational institutions market, which is characterized by a plethora of vendors (most of whom are participating as a long-term investment and/or because of interest in more general markets for educational software, and few if any of whom are making money in this market); and games software, a market whose volatility and requirements for creative product design have made it difficult for vendors to maintain market leverage. Exhibit 11-1 shows vendor shares for the major market segments.

EXHIBIT 11-1   VENDOR SHARES IN MAJOR MARKET SEGMENTS

General Business

Tandy	17%
VisiCorp	16%
MicroPro	12%
IBM	9%
Ashton-Tate	7%
IUS	6%
Microsoft	6%
Apple	4%
Sorcim	4%
Software Publishing	3%
	84%

Systems/Programming

Digital Research	33%
Microsoft	30%
Tandy	10%
Softech	9%
Apple	6%
IBM	4%
	92%

Small Business (Standard)

Tandy	19%
Peachtree	15%
IBM	14%
BPI	11%
Continental Software	9%
Apple	6%
	74%

Games

Avalon-Hill	10%
Atari	8%
Broderbund	7%
Sierra On-Line	7%
Adventure International	7%
Datamost	6%
Sirius Software	6%
	51%

General Business Packages: The tendency towards concentration in this
market is the result of three factors:

1.   Visibility of leading products. Despite the large numbers of
products on the market, most sectors of general business software have
seen a handful of packages emerge as clear market leaders. VisiCalc in
spreadsheets, WordStar in word processing packages and dBase II in DBMS
have been particularly notable (all established a lead in the 1979-1980
timeframe and have kept it ever since), while most of the other leading
packages in these categories have tended to come from well-established
firms. While this is partly a function of product quality, it is also
attributable to the ability of better-established firms to obtain good
distribution, trade press coverage and "brand recognition" for new
entries.

2. Integration. As discussed in Section 3, the current trend in
general business software is towards integrated product families and
integrated packages such as the Lotus 1-2-3 and Context MBA.   In the
case of the former, a large existing installed base of a particular
product provides considerable market leverage, and inevitably reduces
competition for supplying packages to any user who already has one or
more of a vendor's products in the major categories (spreadsheets,
word processing and DBMS). In the case of integrated packages, the
variety of functions provided in a single piece of software reduces
the aftermarket for packages on a micro running one of these to as near
zero so as to make no difference. Moreover, with all of the major
software vendors likely to respond to Lotus and Context with their own

products or licensing and/or marketing tie-ups, the tendency toward
concentration will inevitably be accelerated.

3. Actions of micro vendors. Faced with growing competition in
micro hardware markets, most of the micro vendors have been paying more
attention to software revenues, and have begun to wonder why the third-
party suppliers should be doing so well out of packages for their systems
(the exception to this is Tandy, which has very successfully leveraged
its captive distribution network to maximize software revenues). While
most vendors have sets of "official" third-party applications packages
which they market themselves, the trend over the next few years will
be increasingly towards vendor-supplied and/or bundled packages --
Apple has already introduced this approach on LISA, and other vendors
(notably IBM) are expected to follow suit. While this still represents
an opportunity for third-party suppliers (i.e., in being selected to
supply "official" vendor packages), it is likely to lead to a change in
the balance of power between micro vendors and software developers in
favor of the former.

See Exhibit 11-1 for estimated market shares in general business
packages of the leading ten vendors in this field.

Small Business Packages (Standard Applications): Slightly less concen-
trated than the general business packages marketplace, this sector is
nevertheless dominated by a handful of companies, notably Peachtree,
BPI, Continental Software (particularly successful with its Home
Accountant, which is selling to business as well as personal users) and
the micro vendors, who between them account for more than 74% of the

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market. As in general business packages, this sector is likely to see a greater role played by micro vendors, particularly as micro-based systems begin to replace conventional small business systems.

<u>Vertical Business Packages</u>: Currently the least concentrated of micro software package markets (this is a market where few vendors have more than a 10% market share in any single sector, except where there is a very small market and virtually no competition, and nobody stands out across the board), the vertical package sector is likely to see major changes as a result of two factors:

1. The growing use by major micro vendors of vertical specialist systems houses as distributors -- both IBM and DEC are moving in this direction, and it seems likely to be the norm by the 1985-1986 timeframe.

2. The expansion of micro-based lines into market brackets hitherto occupied by conventional small business systems, leading vendors to direct-market the more expensive models and introduce their own vertical packages, either developed in-house or adopted from third-parties as in general and standard small business applications markets. Most of those who market small business systems offer some vertical packages, and this seems likely to be the case for the micro-based systems that will be replacing these machines. (Some indication of the way that the market is likely to go can be had from looking at products like the IBM 5100, the company's original entry-level system, later replaced by the PC, and S/23 -- vertical packages have been offered by IBM for both systems for major segments.)

The net result will be that, while the sector will still remain fragmented, concentration will increase as larger systems houses previously dealing in small business computers or mini-based systems, and the micro vendors themselves become more active participants.

Games Packages: In 1983, the six top games firms and micro vendors combined are unlikely to account for more than 55% of the market, with the remainder split between a wide variety of smaller firms. Concentration is nevertheless occurring -- at its most basic level, one game is very much like another game and it would be difficult to differentiate on product quality between say, the 50+ variants of Pac-Man on the market, with the result that obtaining retailer shelf space and consumer brand recognition become critical in product success. In addition, the growth of the software distributors, who field fairly short games lines (in relation to the total number of products available, rather than to their other software lines) and the market entry of the large entertainment companies, with their substantial brand recognition and advertising and marketing resources, will inevitably reduce the field of games products.

These same trends, however, are also acting against concentration among companies producing games packages -- games talent does not lend itself very well to large organization environments, and it is likely that smaller firms will be increasingly able to establish themselves in the market by tie-ups with distributors, entertainment companies and micro vendors able to provide the marketing resources they themselves lack.

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Systems and Programming Packages: As discussed in Section 7, the systems and programming packages market is heavily concentrated, with leading software houses such as Microsoft, Digital Research and Softech (developers of the UCSD-p system) and micro vendors accounting for more than 90% of the market. With their existing distribution presence, "brand recognition"(among more sophisticated micro users) and tie-ups between software houses and micro vendors, this situation seems likely to continue for the foreseeable future. Change is, however, possible in the ranks of the software houses, notably in the area of multitasking software over the 1985-1987 timeframe and in whatever the next generation after that turns out to be later in the forecast period. Endorsement by one of the major micro vendors (e.g., IBM) could easily put obscure firms among the industry leaders.

Other Types of Packages:

A. Communications Packages: In their current form they are a relatively open market, with more than half a dozen vendors competing successfully for the low-priced ASCII market, and micro vendors and specialist firms offering more sophisticated emulation packages outside the normal distribution channels for micro software (principally direct to end-user organizations). As discussed in Section 8, this market is likely to decline over the forecast period, and the new videotext and/or data base access packages that will constitute most of the growth in this area after the mid-1980s are likely to be increasingly bundled into micro hardware by vendors (ATT can be expected to adopt this approach). While large numbers of data bases and services will undoubtedly be available, they will probably be grouped under single-access umbrella services.

B.   Miscellaneous Personal Software: As products such as the Home
Accountant have demonstrated, establishing early visibility is also
critical in this sector. Concentration is likely over the 1985-1988
timeframe as low-end micro vendors lay more emphasis on these applica-
tions in their advertising and marketing strategies, leading to the
same kind of adoption pattern by micro vendors common in the business
sector.

Educational Institutions: These represent a small market with a lot of
competition, with the result that no vendor has emerged as a leader
except with individual products in individual market segments. A shake-
out in this sector is clearly inevitable, and the most likely scenario
would be for the various participants (micro vendors, educational
publishers, audio-visual materials suppliers, software houses, educational
institutions and specialist firms) to form loose groupings of companies
and institutions marketing common product lines. The smaller firms are
likely to rely increasingly upon larger groups for marketing and distri-
bution, although there will clearly always be a place for the smaller
firm with a good product which decides to by-pass them and use local
distributor and dealer networks to reach schools.

It is still too early to predict what these groups will look like --
not least in that negotiations are still going on across the board and
on a large scale -- but arrangements such as those between Apple and
the Children's Television Workshop, IBM and Science Research Associates,
Optimum Resource and Xerox Educational Publishing and Broderbund and
the Bank Street School are probably typical of what will be occurring
on a larger scale over the forecast period.

The net result of these trends in all sectors of the micro software market will be towards concentration, with the gap between market leaders and lesser participants widening over the first half of the forecast period (1983-1988). There will, however, still be "room at the top" for newcomers that can establish themselves via particularly successful products (Sorcim, IUS, Software Publishing, Lotus and Context Management have been notable recent examples of this) either in their own right or via endorsement from a leading micro vendor. In the longer-term however, this pattern is likely to see major shifts, discussed below.

Long-Term Structural Shifts

If current trends are towards market concentration with existing groups in the forefront, longer-term trends are likely to change this to a large extent. Factors contributing to this will be:

- The growing desire on the part of micro vendors to gain software revenues as competition heats up and prices and margins decline in the hardware market.

- The rise of the independent software distributors: well-funded, fast-growing and ambitious, this group is likely to seek new avenues of business as the field of competitors grows more crowded, and as current breakneck growth gives way to a more stable and sustained pattern.

- The introduction of down-loading technologies, initially to supply retail outlets (over the next few years) but later to deliver products directly to end-users (likely to start developing over the next few years but occurring on a large-scale only

post-1986. This approach is going to pose problems for many
of those active in conventional methods of software distribution.

- The increasing recognition by authors of their bargaining
  strengths in dealing with vendors: successful authors have been
  able to exact good royalty agreements, the public association
  of their name with given products and various other perks;
  there are also several agents with backgrounds in literary or
  theatrical representation offering their services to software
  authors.

- The availability of large amounts of venture capital for start-
  ups in the area of micro software.

The net result of these developments will be to realign the various
players in micro software development and marketing, with the two
functions becoming increasingly distinct, and package development groups
dealing directly with software distributors and/or micro vendors rather
than with software houses in the Microsoft, VisiCorp, etc. bracket.
With the growth of down-loading services supplying retailers, we antici-
pate that the larger independent distributors, several of which already
offer services to assist developers in product conception and marketing,
will become increasingly active as vendors in their own right.

Over the forecast period, it is thus clear that control of distri-
bution will become increasingly important in this sector, and that
"inventing a better mousetrap" (i.e., developing a superior product)
will become less a function of software houses and more of individuals
and small teams. Ironically, it is the two most backward sectors of

micro software package market, vertical business and educational institutions, that are the model for the most likely long-term development pattern of the industry: the leading-edge vendors in both sectors have been those that have differentiated between the functions of product development (undertaken by teams combining the necessary software development skills with in-depth knowledge of and experience in the subject in question) and marketing (undertaken by specialist and/or larger organizations with established distribution networks and greater marketing capabilities).

APPENDIX

NAMES AND ADDRESSES OF COMPANIES MENTIONED IN THIS REPORT

Accountants Microsystems Inc.
1404 140th Place, NE
Bellevue WA 98007

Acorn Software Inc.
634 North Carolina Ave. S.E.
Washington DC 20003

Addison/Wesley Publishing Co.
Jacob Way, Reading MA 01867

Advanced Operating Systems
450 St. John Rd.
Michigan City IN 46360

Adventure International
P.O. Box 3435
Longwood FL 32759

American Micro Dynamics Inc.
4000 MacArthur Blvd. Ste. 760
Newport Beach CA 92660

Ampersand Corp.
P.O. Box M-84
128 S. George St.
York PA 17405

And All Inc.
8009 Harwin Dr.
Houston TX 77036

Apple Computer Inc.
20525 Mariani Ave.
Cupertino CA 95014

Applied Electronics Corp.
636 Logan Ave.
Helena MT 59601

Altos Computer Systems Inc.
2360 Bering Dr.
San Jose CA 95131

Ashton-Tate
9929 Jefferson Blvd.
Culver City CA 90230

Atari Inc.
1312 Crossman Ave.
Sunnyvale CA 94086

Avalon-Hill
4517 Harford Rd.
Baltimore MD 21214

Banking Information System Services
6620 Harwin Dr. Ste. 275
Houston TX 77036

Basic/4 Information Systems
14101 Myford Rd.
Tustin CA 92680

Bank Street College
610 W. 111 St.
New York NY 10025

Beagle Brothers
4315 Sierra Vista
San Diego CA 92103

Broderbund Software
1938 4th St.
San Rafael CA 94901

Burroughs Corp.
Burroughs Place
Detroit MI 48232

BPI Systems
1600 W. 38th St. #110
Austin TX 78731

CAI Computers
2705 Industrial Ave.
Garland TX 75041

Carlson Computer Corp.
10528 Shaver Rd.
Kalamazoo MI 49002

Chang Laboratories
10228 N. Stelling Rd.
Cupertino CA 95014

Children's Television Workshop
1 Lincoln Plaza
New York NY 10023

Coleco Industries
945 Asylum Ave.
Hartford CT 06105

CBS Software
Columbia Group, CBS Inc.
Hangertown MD 21740

Commodore International Ltd.
950 Rittenhouse Rd.
Norristown PA 19403

CompuServe
5000 Arlington Center Blvd.
Columbus OH 43220

Compusol Inc.
North Court Sq. Ste. #120
5455 Buford Hwy.
Doraville GA 30040

ComputerLand Corp.
14400 Catalina St.
San Leandro CA 94577

Computer Technology Inc.
1455 South State St.
Orem UT 84057

Construction Data Control Inc.
2000 Weems Rd.
Tucker GA 30084

CONDUIT (University of Iowa)
P.O. Box 388
Iowa City IA 52244

Context Management Systems
23864 Hawthorne Blvd. Ste. 101
Torrance CA 90505

Continental Software Inc.
11223 S. Hindry Ave.
Los Angeles CA 90045

Control Data Corporation
8100 34th Ave.
Minneapolis MN 55440

Contractors Management Systems
The Town Center Office Bldg.
1760 Reston Ave. Ste. 515
Reston VA 22090

Corvus Systems
2029 O'Toole Ave.
San Jose CA 95131

Cromemco Inc.
280 Bernardo Ave.
Mountain View CA 94043

Custom Data
P.O. Box 1066
Alamagordo NM 88310

Data General Corporation
15 Turnpike Road
Westboro MA 01581

Dagar Enterprises Inc.
123 York St, Crown Towers
Ste. 2H
New Haven CT 06510

Datamost
9748 Cozycroft Ave.
Chatsworth CA 91311

Data Automation Services
2145 N.W. 10th St.
Gainesville FL 32601

Desktop Software Corp.
228 Alexander St.
Princeton NJ 08540

Digital Equipment Corporation
146 Main St.
Maynard MA 01754

Digital Research Inc.
P.O. Box 579
160 Central Ave.
Pacific Grove CA 93950

Diversified Data Systems Inc.
5259 North Tacoma Ave. Ste. 11
Indianapolis IN 46220

Dow Jones and Co.
22 Cortlandt St.
New York NY 10007

Eagle Software Publishing Inc.
110 W. Lancaster Ave.
Wayne PA   19087

Edu-Ware
28035 Dorothy Dr.
Agoura CA   91303

Encyclopedia Britannica
425 N. Michigan Ave.
Chicago IL   60611

EPYX/Automated Simulations
1043 Kiell Ct.
Sunnyvale CA   94086

Farm Plan Computer Systems
1055 Sunnyvale-Saratoga Rd.
Sunnyvale CA   94087

Great Plains Software
123 15th St. North
Fargo   ND

Hamilton Microsystems
10950 Washington Blvd.
Culver City CA   90230

Harcourt Brace Jovanovich
757 3rd Ave.
New York NY   10019

Harper and Row
10 E. 53rd St.
New York NY   10022

Harris Technical Systems
624 Peach St.
P.O. Box 80837
Lincoln NE   68501

Hayden Software Co.
50 Essex St.
Rochelle Park NJ   07662

Hazeltine Corp.
7680 Old Springhouse Rd.
McLean VA   22102

E.F. Haskell Assts.
1528 E. Missouri Ste. A131
Phoenix AZ   85014

Hewlett-Packard
3000 Hanover St.
Palo Alto CA   94304

High Technology Software Products
2201 N.E. 63rd St.
P.O. Box 14665
Oklahoma City OK   73113

Howard Software Services
8008 Girard Ave. Ste. 310
La Jolla CA   92037

Infocom Inc.
55 Wheeler St.
Cambridge MA   02138

Information Unlimited Software
281 Arlington Ave.
Berkeley CA   94707

Institute For Scientific Analysis
P.O. Box 7186
Wilmington DE   19803

Instant Software
Elm St.
Peterborough NH   03458

Intel Corp.
3065 Bowers Ave.
Santa Clara CA   95051

International Micro Systems
6445 Metcalf
Shawnee Mission KS   66202

Interpertive Education
2036 Winters Dr.
Kalamazoo MI   49002

Johnson Associates
1570 Harwell Ave.
Redding CA   96002

Kaypro (Non-Linear Systems)
533 Stevens Ave.
Solana Beach CA   92075

K-Mart Corp.
3100 W. Big Beaver Rd.
Troy MI   48084

Lanier Business Products Inc.
1700 Chantilly Dr.
Atlanta GA   30324

LaSalle Computing Inc.
1547 DeKalb St.
Norristown PA   19401

The Learning Co.
4370 Alpine Dr.
Portola Valley CA   94025

Lifeboat Associates
1650 3rd Ave.
New York NY   10028

Lotus Development Corp.
Cambridge MA   02138

Charles Mann and Assts.
55722 Santa Fe Trail
Yucca Valley CA   92284

Mattel Inc.
5150 Rosecrans Ave.
Hawthorne CA   90250

R.H. Macy and Co.
151 W. 34th St.
New York NY 10001

MCA Inc.
100 Universal City Plaza
Universal City CA   91608

McClintock Corp.
P.O. Box 430980
Miami FL   33143

McGraw-Hill Inc.
1221 Ave. of the Americas
New York NY 10020

MicroAge Computer Stores
1425 W. 12th Pl.
Tempe AZ   85281

Microbase Software
P.O. Box 40353
Indianapolis IN   46240

Micro Business Systems
1 Crimson Ave. S.
Malverne NY   11565

Micro D
17406 Mt. Cliffwood Crcl.
Fountain Valley CA   92708

Micro Data
5705 Lacey Blvd. No. 104
Olympia MA   98503

Micro Distributors Inc.
Rockville MD

Micro Lab
2310 Skokie Valley Rd.
Highland Pk. IL   60035

Micro Mode
322 Greycliff Dr.
San Antonio TX   78233

Micro Music Inc.
213 Cambridge Dr.
Normac IL   61761

Micron Inc.
10045 Waterford Dr.
Ellicott City MD   21043

MicroPro International
33 San Pablo Ave.
San Rafael CA   94093

Microsoft
400 108th Ave. N.E.
Bellevue WA   98004

Micronetics Inc.
1926 Hollywood Blvd. Ste. 328
Hollywood FL   33020

Milliken Publishing
1100 Researcn Blvd.
St. Louis MO   63132

Minnesota Educational Computing
  Consortium (MECC)
2520 Broadway Dr.
Lauderdale MN   551133

Milton-Bradley Educational
  Software
443 Shaker Rd.
E. Longmeadow MA   01028

Motorola Inc.
1303 E. Algonquin Rd.
Schaumburg IL   60196

Muse Software
347 N. Charles St.
Baltimore MD   21201

NISUS Corp.
1208 Kent Ave.
P.O. Box 2368
W. Lafayette IN   47906

NCR Corp.
1700 S. Patterson Blvd.
Dayton OH   65479

NEC Information Systems
5 Militia Dr.
Lexington MA   02173

New Systems Inc.
2505 E. Thomas Rd. Ste. 9
Phoenix AZ   85016

North American Philips Corp.
100 E. 42nd St.
New York NY   10017

Occupational Computing Company
22311 Ventura Blvd.
Woodland Hills CA   91364

Open Systems Inc.
430 Oak Grove Ste. 409
Minneapolis MN   55403

Osborne Computer Corp.
26500 Corporate Ave.
Hayward CA   94545

Parker Bros.
9200 Wayzata Blvd.
Minneapolis MN   55440

J.C. Penney Co.
1301 Ave. of the Americas
New York NY   10019

Peachtree Software
3445 Peachtree Rd.
N.E. Atlanta GA   30326

Perfect Software Inc.
1400 Shattuk Ave.
Berkeley CA   94709

Phase One Systems
770 Edgewater Dr. Ste. 830
Oakland CA   94621

Prentice-Hall Inc.
Englewood Cliffs NJ   07632

Printers Software Inc.
933 Rte. 23
Pompton Plains NJ   07444

Program Design Inc.
11 Edar Ct.
Greenwich CT   06830

The Program Store
4200 Wisconsin Ave.
Washington DC   20016

Programs Unlimited Inc.
125 S. Service Rd.
Jericho NY   11753

Random House Inc.
400 Hahn Rd.
Westminster MD   21157

R&B Computer Systems
648 S. River Dr.
Tempe AZ   85281

RCA Corp.
30 Rockerfeller Plaza
New York NY 10020

Relational Systems International
5002 Commercial St. S.E.
Salem OR 94025

Remote Computing Corp.
1044 Northern Blvd.
Roslyn NY 11576

Reston Publishing
c/o Prentice-Hall
11480 Sunset Hills Rd.
Reston VA 22090

Roklan Corp.
10600 W. Higgins Rd.
Rosemont IL 60018

Safeway Stores Inc.
Oakland CA 94660

Scholastic Inc.
50 W. 44th St.
New York NY 10036

Sears, Roebuck and Co.
Sears Tower
Chicago IL 60684

Select Information Systems
919 Sir Francis Drake Blvd.
Kentfield CA 94904

Sensible Software
6619 Perham Dr.
W. Bloomfield MI 48033

Science Research Associates
155 N. Wacker Dr.
Chicago IL 60638

Scott Foresman
1900 East Lake Avenue
Glenview IL 60025

Service Software
498 N. Kings Hwy.
Cherry Hill NJ 08034

Sierra On-Line
36575 Mudge Ranch Rd.
Coarsegold CA 93614

Simcon Inc.
7665 Old Springhouse Rd.
McLean VA 22102

Silicon Valley Systems
1625 El Camino Real
Belmont CA 94002

Sirius Software
2011 Arden Way Ste. 2
Sacramento CA 95825

Sir-Tech Software
6 Main St.
Ogdensburg NY 13669

SKU
2600 10th St.
Berkeley CA 94710

Softech Microsystems
9494 Black Mountain Rd.
San Diego CA 92126

Softape
10432 Burbank Blvd.
N. Hollywood CA 91602

Softsel
8295 S. La Cienega Blvd.
Inglewood CA 90301

Software City
P.O. Box 313
Closter NJ 07624

Software Emporium
P.O. Box 3232
Tulsa OK 74101

Software Distributors
10023 W. Jefferson Blvd.
Culver City CA 90230

Software Products International
10343 Roselle St. Ste. A
San Diego CA 92121

Softwaire Center International
11768 W. Pico Blvd.
W. Los Angeles CA   90064

Software Publishing Corp.
2021 E. Landings Dr.
Mountain View CA   94043

Softyme
329 Bryant St.
San Francisco CA   94107

Solid Software
5500 Interstate N. Pkwy.
Atlanta GA   30328

Sorcim
2310 Lundy Ave.
San Jose CA   95131

Source Telecomputing Corp.
1616 Anderson Rd.
McLean VA   22102

Southern Digital Systems
Vernon Park Mall Ste. 806A
Kinston NC   28501

Southwestern Data Systems
10761E Woodside Ave.
Santee CA   92071

Southeastern Software
7743 Briarwood Dr.
New Orleans LA   70127

Spinnaker Software
26 Brighton St.
Belmont MA   02178

Star Computer Systems
18051 Crenshaw Blvd. Ste. D
Torrance CA   90504

Sterling Swift Publishing
1600 Fortview Rd.
Austin TX   78704

Stoneware
50 Belvedere St.
San Rafael CA   94901

Strategic Simulations
465 Fairchild Ste. 108
Mountain View CA   94043

SYCOM
3517 West Beltline Rd.
Madison WI   53707

Synapse Software
5327 Jacuzzi St. Ste. 1
Richmond CA   94804

Synergistic Software
830 N. Riverside Dr. Ste. 201
Renston WA   98055

Tandy/Radio Shack
One Tandy Center
Fort Worth TX   76102

Televideo Systems Inc.
1170 Morse Ave.
Sunnyvale CA   94086

Texas Instruments
13500 N. Central Expwy.
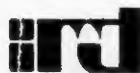P.O. Box 225474
Dallas TX   75265

Thoman Software
1821 Summit Rd.
Cincinnati OH   45237

Thorn-EMI Video Programming
1370 Ave. of the Americas
New York NY   10019

Timex Computer Co.
1579 Straits Turnpike
Middlebury CT   06762

Toys 'R Us Inc.
395 W. Passaic Rd.
Rochelle Park NJ   07662

United Microware Industries
3503-C Temple Ave.
Pomona CA   91768

Univair Inc.
9024 St. Charles Rock Rd.
St. Louis MO 63114

Victor Business Products
3900 N. Rockwell St.
Chicago IL 60618

Vector Graphic Inc.
500 N. Ventu Park Rd.
Thousand Oaks CA 91320

VisiCorp
2895 Zanker Rd.
San Jose CA 95131

Walt Disney Productions
500 S. Buena Vista St.
Burbank CA 91521

Wang Laboratories Inc.
One Industrial Ave.
Lowell MA 01851

Warner Communications Inc.
75 Rockerfeller Plaza
New York NY 10019

Wadsworth Electronic Publishing Co.
10 Davis Dr.
Belmont CA 94002

John Wiley and Co.
605 3rd Avenue
New York NY 10058

Xerox Corp.
800 Long Ridge Rd.
Stamford CT 06904